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jc915 U.S. PTO 09/29/00

UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No. 10022/035
Total Pages in this Submission 68

TO THE ASSISTANT COMMISSIONER FOR PATENTS
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Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS

jc825 U.S. PTO 09/676227 09/29/00

and invented by:

Scott R. Sargent
Hugh W. Ryan
Stanton J. Taylor

If a CONTINUATION APPLICATION, *check appropriate box and supply the requisite information:*

☐ **Continuation** ☐ **Divisional** ☐ **Continuation-in-part (CIP)** of prior application No.: _____

Which is a:

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Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 49 pages and including the following:
   a. ☒ Descriptive Title of the Invention
   b. ☒ Cross References to Related Applications *(if applicable)*
   c. ☐ Statement Regarding Federally-sponsored Research/Development *(if applicable)*
   d. ☐ Reference to Microfiche Appendix *(if applicable)*
   e. ☒ Background of the Invention
   f. ☒ Brief Summary of the Invention
   g. ☒ Brief Description of the Drawings *(if drawings filed)*
   h. ☒ Detailed Description
   i. ☒ Claim(s) as Classified Below
   j. ☒ Abstract of the Disclosure

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68

Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*
   a. ☒ Formal Number of Sheets 13
   b. ☐ Informal Number of Sheets _____
4. ☒ Oath or Declaration
   a. ☐ Newly executed *(original or copy)* ☒ Unexecuted
   b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*
   c. ☐ With Power of Attorney ☐ Without Power of Attorney
   d. ☐ *DELETION OF INVENTOR(S)*
   Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference *(usable if Box 4b is checked)*
   The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ Computer Program in Microfiche *(Appendix)*
7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*
   a. ☐ Paper Copy
   b. ☐ Computer Readable Copy *(identical to computer copy)*
   c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☐ Assignment Papers *(cover sheet & document(s))*
9. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*
10. ☐ English Translation Document *(if applicable)*
11. ☐ Information Disclosure Statement/PTO-1449 ☐ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☒ Acknowledgment postcard
14. ☒ Certificate of Mailing
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Accompanying Application Parts (Continued)

15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

16. ☐ Additional Enclosures *(please identify below):*

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	47	- 20 =	27	x $18.00	$486.00
Indep. Claims	2	- 3 =	0	x $78.00	$0.00
Multiple Dependent Claims (check if applicable) ☐					$0.00
				BASIC FEE	$690.00
OTHER FEE *(specify purpose)*					$0.00
				TOTAL FILING FEE	$1,176.00

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Dean E. McConnell

Signature

Dean E. McConnell, Atty Reg. No. 44,916

Dated: 9/29/00

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Dean E. McConnell

Dean E. McConnell, Reg. No. 44,916

PATENT
Case No. 10022/035

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION

INVENTOR(S): Scott R. Sargent
Hugh W. Ryan
Stanton J. Taylor

TITLE: ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS

ATTORNEYS: Dean E. McConnell
BRINKS HOFER GILSON & LIONE
One Indiana Square, Suite 2425
Indianapolis, Indiana 46204
(317) 636-0886

09/676,360

ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS

This application claims the benefit under 35 U.S.C. §119(e) of U.S. provisional application Serial No: 60/156,962 filed on October 1, 1999.

Field of the Invention

The present invention relates generally to business computing systems, and more particularly to methods and systems of performing netcentric computing.

Background of the Invention

Computer based business solutions have existed for various different types of transactions since the mid-to-late 1960s. During this time period, the technology focused on the use of batch technology. In batch processing, the business user would present a file of transactions to the application. The computer system would then run through the transactions, processing each one, essentially without user intervention. The system would provide reporting at some point in the batch processing. Typically, the reports would be batch printed, which in turn, would be used by the business user to correct the input transactions that were resubmitted along with the next batch of transactions.

In the 1970s, businesses began a transition to on-line, interactive transactions. At a conceptual level, this processing opened up the file of transactions found in batch transactions and allowed the user to submit them one at a time, receiving either immediate confirmation of the success of the transaction or else feedback on the nature of the transaction error. The conceptually simple change of having the user interact with the computer on a transaction-at-a-time basis caused huge changes in the nature of business computing. More important, users saw huge changes in what they could do on a day-to-day basis. Customers were no longer forced to wait for a batch run to process the particular application. In essence, the computer had an impact on the entire work flow of the business user.

Along with the advent of on-line interactive systems, it was equally significant that the systems provided a means for the business user to communicate with others in the business as the day-to-day business went along. This capability was provided on the backbone of a wide area network (WAN). The WAN was in

itself a demanding technology during this time period and because of these demands telecommunications groups emerged within organizations, charged with the responsibility to maintain, evolve, and manage the network over a period of time.

The theme of the 1980s was database management systems (DBMSs). Organizations used and applied database technology in the 1970s, but in the 1980s they grew more confident in the application of DBMS technology. Because of the advances in network technology, the focus was now on the sharing of data across organizational and application boundaries. Curiously, database technology did not change the fundamental way in which business processing was done. DBMS made it more convenient to access the data and to ensure that it could be updated while maintaining the integrity of the data.

In the 1990s, technology began to shift toward client/server computing. Client/server computing is a style of computing involving multiple processors, one of which is typically a workstation, and across which a single business transaction is completed. Using the workstation, the transaction entered by the user could now be processed on a keystroke-by-keystroke basis.

Furthermore, there was a change in the communications. With client/server, users could communicate with others in the work group via a local area network (LAN). The LAN permitted workstation-to-workstation communications at speeds of 100 to 1,000 times what was typically available on a WAN. The LAN was a technology that could be grown and evolved in a local office with little need for direct interaction from the telecommunications group.

During the late 1990s, the Internet began to receive widespread use by consumers and businesses. In the business world, the Internet has caused the concept of business users to expand greatly because of the way in which computers are now capable of being interconnected. In addition, the cost of computers has dropped to the point that it is affordable for almost every household to own a computer if they so desire. As such, a need to expand the reach of computing both within and outside the enterprise, and that enables the sharing of data and content between individuals and applications has developed.

Summary of the Invention

The present invention discloses an architecture for a netcentric computer system that is capable of expanding the reach of computing both within and outside the business enterprise. An discloses architecture for a netcentric computing system is disclosed that brings new technologies to the forefront, especially in the area of external presence and access, ease of distribution, and advanced media capabilities. Browsers, which provide a universal client, offer a new option in distributing functionality to both internal and external users. In prior art client/server environments, distributing an application internally or externally for a business enterprise require the application to be recompiled and tested for all specific workstation operating systems. In addition, it usually required loading the application on each client or workstation.

The browser-centric application style offers an alternative to these prior art solutions. Web browsers provide a "universal client" that offer users a consistent and familiar graphical user interface. Using a browser, a user can launch many types of applications and view many types of documents and media types. This can be accomplished on different operating systems/platforms and is independent of where the applications or documents reside. To that end, browsers change the way in which information is stored, transferred and updated as well as the way in which applications are executed.

Netcentric computing systems also provide an external presence and unprecedented access to supplier-to-customer relationships. By connecting a business node to the Internet, a series of opportunities is opened up to reach an audience outside a company's traditional internal users. Consequently, the Internet has become another vehicle for companies to conduct business with their customers and suppliers through the broadcasting of product and service descriptions, exchanging interactive information and conducting actual business transactions.

Another benefit of netcentric computing systems is the ability to digitize, organize, and deliver textual, graphical and other information in addition to traditional data to a broader audience. Netcentric technologies (such as HTML documents, plug-ins and Java) and standardization of media information formats enable support for these types of complex documents, applications, and even

nondiscrete data types such as audio and video. Advances in network bandwidth and compression technologies continue to make richer media-enabled applications more feasible on the Internet.

Netcentric computing systems also provide advantages over client/server computing by providing application version checking and dynamic updating capabilities. Configuration management of traditional client/server applications, which tend to be stored on both client hard disks and on the server, is a major issue for many corporations. The distribution and update problems of such applications that are packaged as one large, or a combination of a few large executable files, makes minor updates difficult for even a small-scale user population because, every time an update is made, a process must be initiated to distribute new code to all client machines.

Both netcentric computing systems as well as traditional client/server systems are tiered architectures. In both cases, there is a distribution of presentation services, application code and data across clients and servers. In addition, in both cases there is a networking protocol that is used for conducting communication between clients and servers. However, there are a number of important differences between client/server systems and netcentric systems.

For netcentric computing systems, the manner in which the application logic is distributed to clients differs from traditional client/server systems. In netcentric computing systems, application logic can be packaged into components and distributed from a server to a client over a network connection between the client and server. In traditional client/server systems, the application logic is split between the client and the server on a permanent basis; there is normally no dynamic distribution of application logic.

The client in netcentric computing systems also differs from the traditional client in client/server system. In netcentric computing systems the client has standardized interfaces so that an application can execute with a client that can run on multiple operating systems and hardware platforms. In traditional client/server systems, the client must be custom-made for a specific operating system and hardware platform. Further, the way in netcentric computing systems can be extended and adapted is different. Components enable netcentric computing systems

to be adaptable to a variety of distribution styles, from a "thin client" to a "fat client." In comparison, as known to those skilled in the art, once designed and built, client/server systems are less easily adapted for use with more than one computing style.

Netcentric architectures for netcentric computing systems support a style of computing where processes on different machines communicate using messages. In this style of computing, "client" processes delegate business functions or other tasks (such as data manipulation logic) to one or more server processes. Server processes respond to messages from clients. Business logic can reside on both client and/or server. Clients are typically PCs or workstations with a graphical user interface running a web browser. Servers are preferentially implemented on UNIX, NT, or mainframe machines. In netcentric computing systems, there is a tendency to move more business logic to the servers, although "fatter" clients result from new technologies such as Java and ActiveX.

A preferred embodiment of the present invention discloses an architecture for a netcentric computing system. The architecture for the netcentric computing system includes a business solutions architecture layer; an application architecture layer in communication with said business solutions layer; a technical architecture layer in communication with said application architecture layer; and a platform architecture layer in communication with said technical architecture layer.

Another preferred embodiment of the present invention discloses a netcentric computing system. The netcentric computing system includes a business solutions architecture layer that has an environment layer, a business requirements layer and a data architecture layer. An application architecture layer is in communication with the business solutions layer. A technical architecture layer that includes an infrastructure layer and a system software layer is in communication with the application architecture layer. The system software layer includes a netcentric execution architecture, a development architecture and an operations architecture. A platform architecture layer is in communication with the technical architecture layer. The platform architecture layer includes a hardware/network layer that includes the physical components that makeup the netcentric computing system.

Further objects and advantages of the present invention will be apparent from the following description, reference being made to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

Brief Description of the Drawings

Figure 1 illustrates a block diagram of the architecture for a netcentric computing system

Figure 2 illustrates a block diagram of the preferred technical architecture of the netcentric computing system.

Figure 3 illustrates a block diagram of the preferred development architecture of the netcentric computing system.

Figure 4 depicts an illustrative preferred physical picture of a netcentric computing system.

Figure 5 illustrates a block diagram of the preferred netcentric execution architecture of the netcentric computing system.

Figure 6 illustrates the preferred presentation services of the netcentric execution architecture.

Figure 7 illustrates the preferred information services of the netcentric execution architecture.

Figure 8 illustrates the preferred communications services of the netcentric computing system.

Figure 9 illustrates the preferred communications fabric services of the netcentric computing system.

Figure 10 illustrates the preferred environment services of the netcentric computing system.

Figure 11 illustrates the preferred transaction services of the netcentric computing system.

Figure 12 illustrates the preferred base services of the netcentric computing system.

Figure 13 illustrates the preferred business logic services of the netcentric computing system.

Figure 14 illustrates the preferred operations architecture of the netcentric computing system.

Detailed Description of the Presently Preferred Embodiments of the Invention

Referring to Fig. 1, a block diagram of an architecture for a netcentric computing system 10 is illustrated. The architecture for the netcentric computing system 10 includes a business solutions architecture layer 12, an applications architecture layer 14, a technical architecture layer 16 and a platform architecture layer 18. Generally speaking, the business solutions architecture layer 12 includes an environment layer 20, a business requirements layer 22 and a data architecture layer 24. The technical architecture layer 16 includes a infrastructure layer 26 and a system software layer 28. The platform architecture layer 18 includes a hardware/network layer 30.

In the preferred embodiment, the environment layer 20 uses applications designed to handle factors that influence the business requirements layer 22 and the technical architecture layer 16. These factors may be either internal (e.g. - profitability) or external (e.g. - government regulation or market competition). The business requirements layer 22 uses applications designed to handle the business needs of the organization that can be automated with the assistance of the netcentric computing system 10. These needs include providing products and services and interacting with business partners through the use of the netcentric computing system 10. Both the environment layer 20 and the business requirements layer 22 are mainly concerned with processing business-level processes, strategies and direction.

The data architecture layer 24 consists of a high-level data design with applications designed to satisfy the needs of a business enterprise's data handling requirements in terms of entities and relationships. The structure and relationships of data entities are used to define the basic relationships of business functions and applications that comprise the data architecture layer 24. The infrastructure layer 26 deals with those components of an architecture that are used by multiple applications and that are developed and maintained within the business enterprise. Usually, these technical components help support the applications architecture 14. The

infrastructure layer 26 also includes the technical infrastructure of the organization that manages and operates the netcentric computing system 10.

The system software layer 28 includes the software applications and standards obtained from and maintained by outside vendors (e.g. a database management system.) In addition, the system software layer 28 may include applications that are custom written for the enterprise. The hardware/network layer 30 deals with central processing units or workstations, servers, local area networks (LAN), wide area networks (WAN), and other hardware and physical network components of the architecture for the netcentric computing system 10.

The exact structure of the business solutions architecture 12 will vary depending on the environment layer 20, the business requirements layer 22 and the data architecture layer 24. As previously set forth, the environment layer 20 and the business requirements layer 22 are mainly concerned with business-level processes, strategies and directions. The data architecture layer 24 is designed to serve the data needs of an enterprise based on the setup and structure of the environment layer 20 and the business requirements layer 22. Those skilled in the art should recognize that the decisions made for the application architecture 14 and the data architecture 24 drive the requirements of the technical architecture 16 and the platform architecture 18.

In general, the application architecture 14 is defined herein as the services that perform business functions on a computer. It represents the components or applications that provide automation support for a business function or activity in the business process. For example, a manufacture's sales and marketing netcentric computing system might include sales tracking applications and the distributed data architecture to support both networked sales offices and mobile sales persons.

As previously set forth, the infrastructure layer 26 and the system software layer 28 are combined to form the technical architecture 16. In general, the technical architecture 16 is where the buy decisions of the system software marketplace are combined with the build decisions for the needs of specific applications. Referring to Fig. 2, the technical architecture 16 of the netcentric computing system 10 is comprised of a netcentric execution architecture 32, a

development architecture 34 and an operations architecture 36. Each of these architectures will be discussed in detail in the sections that follow.

The platform architecture 18 can be described as the things a person can see. The platform architecture 18 provides a framework for selecting the platform components required: servers, workstations, operating systems and networks. The platform architecture 18 represents the overall technology platform for the implementation and deployment of the previously mentioned netcentric execution architecture 32, development architecture 34, operations architecture 36 and the software applications that are included in these architectures 32, 34, 36.

Referring to Fig. 3, the development architecture 34 includes a common user interface 40, at least one process management tool 42, at least one personal productivity tool 44, at least one quality management tool 46, at least one systems building tool 48, at least one environment management tool 50, at least one program and project management tool 52, at least one team productivity tool 54 and at least one information management tool 56. The purpose of the development architecture 34 is to support the tasks involved in the analysis design, construction and maintenance of business systems as well as the associated management processes. It is important to note that the development architecture 34 should adequately support all of the development tasks, not just the code/compile/test/debug cycle.

The common user interface 40 of the development architecture 34 provides a common launching place for all of the tools in the netcentric computing system 10 to make it more integrated and consistent. All of the tools that are used in the development architecture 34 are presented to the developer via a single view of the entire environment. Tools that support the common user interface 40 are known as window managers (e.g., MicroSoft Windows, Presentation Manager and Motif). The process management tools 42 are used to integrate the development architecture 34 by providing tool-to-tool communication and workflow management. Tool-to-tool communication integrates tools by enabling information in the form of short messages to be passed from one tool to another. Those skilled in the art would recognize that tools may take the form of specialized software applications or applets designed to perform predetermined tasks in the netcentric computing system 10.

Workflow management integration builds a development methodology and process into the tool environment. Workflow management enforces the correct sequencing of tasks and tools. Process integration is often implemented through the use of integration frameworks or through custom coding of interfaces. The personal productivity tools 44 are a collection of software applications that enhance the development environment for the individual developer. These applications are typically integrated suites of PC software that allow the developer to work on the workstation independent of the development server or mainframe to complete tasks, such as analysis and documentation. The personal productivity tools 44 are basic office automation applications and typically include spreadsheet applications, word processing applications, graphic applications (e.g., drawing, diagramming, and presentation), and personal calendar applications. Those skilled in the art would recognize that various personal productivity tools 44 may be incorporated in the present invention.

The quality management tools 46 support the planning and measurement of quality in the enterprise. In the preferred embodiment, quality management is a management discipline that promotes a customer satisfaction focus and continuous improvement. The preferred quality management tools 46 may be selected from the group consisting of quality function deployment tools, measurement and metrics tools, statistical process control tools, and continuous improvement tools. In the preferred embodiment of the present invention, these quality management tools 46 would be represented by software applications that are directed toward the specific needs of the business enterprise.

The system building tools 48 comprise the core of the development architecture and are used to design, build and test the overall functionality of the netcentric computing system 10. In the preferred embodiment of the present invention, all of the system building tools 48 must be integrated and share development objects appropriately. The preferred system building tools 48 may be selected from the group consisting of analysis and design tools, reverse engineering tools, construction tools, testing tools and configuration management tools.

The environment management tools 50 monitor performance, provide help desk support, manage and distribute changes to the development architecture 34,

administer the environment, and track and plan capacity. The development architecture 34 supports many different functional and technical requirements (illustrated by the execution architecture 36), many different development teams, and tools from many different product vendors, and often must support projects in different states of the development life cycle. Some examples of environment management tools 50 may be selected from the group of service management tools, systems management tools, update management tools and service planning tools.

The program and project management tools 52 provide many key features that assist project planners in planning, scheduling, tracking and reporting on project segments, tasks and milestones. In the preferred embodiment of the present invention, the program project management tools 52 are differentiated by the ability to support multiple projects, complex functions and adequate performance when supporting multiple concurrent projects. The program and project management tools 52 may be selected from the group consisting of planning tools, scheduling tools, tracking tools and reporting tools. Those skilled in the art would recognize that depending on the enterprise's operations, the programming and project management tools may vary from enterprise to enterprise.

The team productivity tools 54 are used to make the work, sell and project team as a whole more productive within the enterprise. Instead of the software residing on an individual's PC or work station, the team productivity tools 54 are typically LAN based and shared by the project members. In the preferred embodiment of the present invention, the team productivity tools 54 are focused on enhancing communication and information sharing within the business enterprise and may be selected from the group consisting of e-mail tools, teamware tools, publishing tools, group calendar tools, and methodology browsing tools. Those skilled in the art would recognize that several other team productivity tools may be incorporated into the architecture for the netcentric computing system 10.

The information management tools 56 are provided through a development repository. In a preferred embodiment of the present invention, the information is stored on such devices as hard drives, CD-ROMS, and magnetic tapes. However, those skilled in the art would recognize that various other storage devices may be used as well. The information management tools 56 share a common repository of

development objects, design documents, source code, and test plans and data. Ideally, the repository would be a single database with an all-encompassing information model. The development repository is built by integrating the repositories of the different development tools through various interfaces. Specific tool vendors may also build part of the integrated repository by integrating specific products. In the preferred embodiment of the present invention, the information management tools 56 include folder management tools and repository management tools.

For a more detailed discussion of the preferred development architecture 34 refer to U.S. Patent Application Serial No. _____, entitled DEVELOPMENT ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS, which is incorporated herein by reference in its entirety.

Referring to Fig. 4, the physical picture of an illustrative example of a netcentric computing system 10 is illustrated. The physical layer of the netcentric computing system 10 architecture 34 preferentially includes a business enterprise 90 that may include at least one client 78, at least one database server 92, at least one firewall 94, at least one application server 96, at least one web server 98 and a LAN connection 100. As illustrated in Fig. 4, the LAN connection 100 is used to interconnect various components or computing devices that are located at a first business enterprise location 102 within the business enterprise 90. Those skilled in the art would recognize that various types of LAN connections 100 exist and may be used in the present invention.

For the purpose of the present invention, the firewall 94 is used to isolate internal systems from unwanted intruders. The firewall 94 isolates the web servers 98 from all Internet traffic that is not relevant to the system. In the preferred embodiment, the only requests allowed through the firewall 94 are for services on the web servers 98. All requests for other applications (e.g., FTP, Telnet) and other IP addresses are blocked by the firewall 94.

The web servers 98 are the primary interface to the clients 78, 79, 120 for all interactions with the applications of the netcentric computing system. The main task of the web servers 98 is to authenticate the clients 78, 79, 120, establish a secure from the clients 78, 79, 120 to the web servers 98 using encrypted messages,

and allow the applications the clients 78, 79, 120 are using to transparently access the resources of the netcentric computing system 10. The web servers 98 are responsible for accepting incoming HTTP messages and fulfilling the requests. For dynamic HTML page generation, requests are forwarded to the application servers 96. Static pages, such as help pages, are preferably generated by the web servers 98.

In the preferred embodiment, the primary function of the application servers 96 is to provide a link through which the web servers 98 can interact with the host, trigger business transactions, and send back resulting data to the clients 78, 79, 120. A fundamental role of the application servers 96 is to manage the logical flow of the transactions and keep track of the state of the sessions. The application servers 96 are also responsible for managing all sessions.

Further, in the preferred embodiment of the present invention, the main purpose of the database servers 92 is to handle an application log. All requests sent to the web servers 98 and application servers 96 as well as responses are logged in the application log. The application log is used for traceability. In the preferred embodiment, requests are logged in the application log directly by the application server 96. Those skilled in the art would recognize that any number of data items can be monitored by the application log.

As further illustrated in Fig. 4, a second business enterprise location 104 may be connected with the first enterprise location 102 using a intranet connection 106. Those skilled in the art would recognize that various intranet connections 106 exist and may be used in the present invention. As those skilled in the art would recognize, the intranet connection 106 allow the computing resources of the second enterprise location 104 to be shared or connected with the computing resources available at the first enterprise location 102. Several other enterprise locations may be connected with the netcentric computing system 10.

In the preferred embodiment the firewall 94 of the corporate headquarters 102 is connected with a dedicated Internet connection 107 to a plurality of remote clients 78. Preferentially, the remote clients 79 that are connected to the Internet connection 106 access data at the business enterprise 90 through the Internet connection 107 using a browser application. The Internet connection 106 gives the

remote clients 79 the ability to gain access to information and data content contained on the database server 92, the application server 96 and the web server 98.

The business enterprise 90 is connected with at least one supplier 108 through an extranet connection 110. As known in the art, the extranet connection 110 can be one of several different types of communication backbones, such as the Internet, DSL connections or virtual private networks. The supplier 108 may have a supplier firewall 112 that is used to secure the information and data stored at the supplier 108. A supplier intranet connection 114 may be connected with the supplier firewall 112 to allow users of the extranet connection 110 to gain access to information contained on the supplier application server 116 and/or the supplier web server 118.

A supplier client 120 may be connected with the intranet connection 114 at the supplier 108 to allow the supplier client 120 to gain access, modify, update or view information and/or data that is contained on the supplier application server 116 and/or the supplier web server 118. The supplier client 120 may also gain access to information and data content at the business enterprise 90 through the extranet connection 110. Preferentially the supplier clients 120 gain access to the business enterprise through the use of a browser application. Those skilled in the art would recognize that the supplier 108 may have various network connections that are not illustrated in Fig. 4. Although these internal connections are not illustrated, those skilled in the art would recognize that this should not be construed as a limitation of the present invention.

Referring to Fig. 5, the netcentric execution architecture 32 for the netcentric computing system 10 is illustrated. The netcentric execution architecture 32 identifies and handles common run-time services required when an application executes in the netcentric computing system 10. The run-time services can be broken down into logical areas: presentation services 62, information services 64, communication services 66, communication fabric services 68, transaction services 70, environment services 72, base services 74, and business logic services 76.

As shown in Fig. 5, the netcentric execution architecture 32 is best represented as an extension to a client/server execution architecture. The figure shows the logical representation of a requestor and a provider designated by a client

78 and a server 80. Although Fig. 5 only shows one client 78 and one server 80, a physical implementation of the netcentric execution architecture 32 typically has many clients and many servers, as set forth above in the discussion of the physical make-up of the netcentric computing system 10. Thus, the services described below can be located on one physical machine, but most likely will span many physical machines, as illustrated in Fig. 4. As such, those skilled in the art would recognize that the server 80 may represent the database server 92, the application server 96 or the web server 98.

Referring to Fig. 6, the preferred presentation services 62 of the netcentric execution architecture 34 is illustrated. The presentation services 62 use presentation services applications to manage the human-computer interface in the netcentric computing system 10, including capturing user actions and generating resulting events, presenting data to the user, and assisting in the management of the dialog flow of processing. Typically, the presentation services 62 are required only by the client workstations 78, 79, 120. As set forth in more detail below, the preferred presentation services 62 may be selected from the group consisting of applications for desktop manager services 130, direct manipulation services 132, forms services 134, input device services 136, report and print services 138, user navigation services 140, web browser services 142 and window system services 144. Those skilled in the art would recognize that other services may be incorporated into the netcentric computing system 10.

The desktop manager services 130 provide for implementing the "desktop metaphor," which is commonly used to refer to a style of user interface that tries to emulate the idea of a physical desktop. It allows the user to place documents on the desktop, launch applications by clicking on a graphical icon, or discard files by dragging them onto a picture of a wastebasket. The desktop manager services 130 include facilities and devices for launching applications and desktop utilities and managing their integration.

The direct manipulation services 132 contain applications that provide a direct manipulation interface (often called "drag and drop"). A direct manipulation interface allows users to management multiple application objects by manipulating visual representations of those objects. For example, a user may sell stock by

dragging stock icons out of a portfolio icon and onto a trading floor icon. Direct manipulation services 132 can be further divided into display validation and input validation.

The forms services 134 includes applications that use fields to display and collect data. A field may be a traditional 3270-style field used to display or input textual data, or it may be a graphical field such as a check box, a list box, or an image. The forms service 134 provides support for display, input-validation, mapping support and field interaction management.

The input devices 136 detect user input from a variety of input technologies, such as pin based, voice recognition, keyboards, touch-screens, mouses, digital cameras, and scanners. Those skilled in the art would recognize that various input devices 136 exist and may be used with the present invention. As such, those skilled in the art would recognize that the scope of the present invention should not be limited by the illustrative input devices 136 set forth briefly above.

The report and print services 138 support the creation and on-screen previewing of paper or photographic documents, which contain screen data, application data, graphics or images. Those skilled in the art would recognize that various report and print services 138 may be used as part of the netcentric computing system 10.

The user navigation services 140 provide a user with a way to access or navigate between functions within or across applications. A common method for allowing a user to navigate within an application is to list available functions or information by means of a menu bar with associated pull-down menus or context-sensitive pop-up menus. A text-based menuing system that provides a list of applications or activities for the user to choose from may also be used. Those skilled in the art would recognize that various user navigation services 140 may be incorporated in the present invention.

The web browser services 142 provide applications that allow users to view and interact with applications and documents made up of varying data types, such as text, graphics and audio. As such, in the preferred embodiment the web browser services 142 provide support for navigation within and across documents and files no matter where they are located through the use of links embedded into the

document content or the file structure. The web browser services 142 retain the link connection, i.e., document physical location, and mask the complexities of that connection from the user. The web browser services 142 can be further subdivided into browser extension services 146, web browser form services 148 and web browser user navigation services 150. The web browser services 142 allow browser applications on the clients 78, 79, 120 to interact with the netcentric computing system 10.

The browser extension services 146 provide support for executing different types of applications from within the web browser services 142. These applications provide functionality that extend browser capabilities. The key web browser extensions are plug-ins, helper-application viewers, Java applets, Active/X controls and Java beans. Those skilled in the art would recognize various other web browser extensions may be used by the netcentric computing system 10.

The web browser form services 148, like the forms services 134 outside of the web browser services 142, enable applications to use fields to display and collect data. The difference between the two services is the technology used to develop the forms that are used by the web browser form services 148. The most common type of web browser form services 148 within the web browser is Hyper-Text Mark-up Language (HTML). Those skilled in the art would recognize that as the web browser services 142 expand various other types of web browser forms services 148 will be readily incorporated into the present invention.

The web browser user navigation services 150, like the user navigation services 140 outside the web browser services 142, provide users with a way to access or navigate between functions within or across applications. These web browser user navigation services 150 can be subdivided into three categories: hyperlink, customized menu and virtual reality services. Those skilled in the art would recognize that various user navigation services 150 may be incorporated into the present architecture for the netcentric computing system 10.

The windows system 144, which is typically part of the operating system used on the clients 78, 79, 120, provide the base functionality for creating and managing a graphical user interface on the workstations. As known in the art, a graphical user interface can detect user actions, manipulate windows on the display,

and display information through windows and graphical controls. Those skilled in the art would recognize that various operating systems use windows based environments and may be used in the present invention.

For a more detailed discussion of the preferred presentation services 62 refer to U.S. Patent Application Serial No. _____, entitled PRESENTATION SERVICE ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS, which is herein incorporated by reference in its entirety.

Referring to Fig. 7, the preferred information services 64 of the netcentric execution architecture 32 is illustrated. The information services 64 manage information and enable applications to access and manipulate data stored locally or remotely from documents, databases, or external data sources. The preferred information service 64 is one that minimizes a software applications dependency on physical storage and location within the netcentric computing system 10. Information services 64 can also be accessed and used by the end user when ad-hoc data and document access are integral to the software application work task.

In the preferred embodiment of the present invention, the preferred information services 64 includes database services 160 and document services 162. Database services 160 are responsible for providing access to a local or remote database as well as maintaining integrity of the data within the database. Data may also be stored on either a single physical platform or in some cases across multiple platforms. The database services 160 are typically provided by database management systems (DCMS) vendors and accessed via embedded or call-level SQL variants and supersets. Depending upon the underlying storage model, non-SQL access methods may be used instead.

As illustrated in Fig. 7, the preferred database services 160 may include storage services 164, indexing services 166, security services 168, access services 170 and replication/synchronization services 172. Storage services 164 manage and store the actual physical data. As known in the art, storage services 166 provide a mechanism for saving information so that data will live beyond program execution. Data is often stored in relational format (an RDBMS) but may also be stored in an object-oriented format (OODBMS) or other structures such as IMS and VSAM.

The indexing services 166 provide a mechanism for speeding up data retrieval from the storage services 164. In relational databases one or more fields can be used to construct the index. Therefore, when a user searches for a specific record, rather than scanning the whole table sequentially, the index is used to find the location of that record faster. Those skilled in the art would recognize that various indexing applications may be used in the indexing services 166 of the netcentric computing system 10.

The preferred security services 168 contain applications that enforce access control to ensure that records and data are only visible or editable by authorized people for approved purposes. As known in the art, most database management systems provide access control at the database, table, or row levels to specific users and groups as well as concurrency control. They also provide execution control for such things as stored procedures and database functions. The access services 170 enable an application to retrieve data from a database as well as manipulate (insert, update, or delete) data in a database. As known in the art, SQL is the primary approach for accessing records in today's database management systems.

The preferred replication/synchronization services 172 use applications to support an environment in which multiple copies of databases must be maintained. This is very important to enterprises that must maintain data in the event that one or more system goes down due to hardware or software failure. In addition, the replication/synchronization services 172 use applications that perform the transactions required to make one or more information sources that are intended to mirror each other consistent. Those skilled in the art would recognize that the method in which the preferred replication/synchronization services 172 performs its tasks will vary from enterprise to enterprise, depending on the particular needs of the enterprise.

The document services 162 provide similar structure and control for documents that database services 160 apply to record-oriented data. As known in the art, a document is defined as a collection of objects of potentially different types (e.g., structured data, unstructured text, images or multimedia) that a business user deals with. Regardless of the application used to create and maintain the component

parts, all parts together constitute the document, which is managed as a single entity, usually in the form of a file.

The preferred document services include storage services 164, indexing services 166, security services 168, access services 170, replication/synchronization services 172 and versioning services 174. The storage services 168 manage the physical storage of documents. Generally, the documents are stored in a repository using one of the following methods: proprietary database, industry standard database, or industry standard database and file system. Indexing services 166 are applications that allow users to locate documents stored in the database. As known in the art, locating documents and content within documents is a complex problem and involves several alternative methods. Most document management products provide index services that support searching document repositories by using attribute searching, full-text searching, context searching, or Boolean searching.

The preferred security services 168 use applications that only allow documents to be accessed exclusively through the document management backbone. The document management backbone determines how documents are accessed and who may access the documents. Preferentially, if a document is checked in, checked out, routed, viewed, annotated, archived, or printed, it should be done only by authorized users. As known in the art, security services 170 can be designed to control access at the user, role, and group levels. Those skilled in the art would recognize that the type of security services used in the present invention will vary depending upon the needs of the particular business enterprise.

The replication/synchronization services 172 use applications to support an environment in which multiple copies of documents are maintained. In addition, the replication/synchronization services 172 perform the transactions required to make one or more information sources that are intended to mirror each other consistent. As known in the art, there are many ways to provide replication/synchronization services 172, depending upon the needs of the particular enterprise using the netcentric client/server computing system 10.

In the preferred embodiment, the versioning services 174 use applications to maintain a historical record of the changes to a document over time. By maintaining this record, versioning services 174 allow for the recreation of a document as it

looked at any given point in time during its evolution. Depending on the document, versioning can be accomplished using one of several methods known and presently used in the art.

For a more detailed discussion of the preferred information services 64 refer to U.S. Patent Application Serial No. _____, entitled INFORMATION SERVICE ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS, which is incorporated herein by reference, in its entirety.

As illustrated in Fig. 8, another service in the preferred netcentric execution architecture 32 is the communication services 66. The communication services 66 enable applications to interact transparently with other applications, regardless of whether they reside on the same workstation or on a remote workstation. Referring to Fig. 8, there are four preferred communication services 66 provided in the preferred architecture for the netcentric computing system 10, which include messaging services 179, communication security services 184, virtual resource services 186 and directory services 188. The messaging services 179 can be further broken down into core messaging services 180 and specialized messaging services 182, which are set forth in detail below.

For the purpose of the present invention, messaging is the process of sending information or commands between two or more recipients. Recipients may be workstations, people, or processes within a workstation. To send this message, a protocol (or in come cases, multiple protocols) is used that both the sender and receiver can understand. As known in the art, a protocol is a set of rules describing, in technical terms, how two end points should exchange information. Protocols exist at several levels during the exchange of information. Protocols facilitate transport of the message carrying the information. Both end points must recognize and observe the protocol. As an example, one of the most widely used protocols in today's networks is the TCP/IP protocol, which is used by the Internet.

The core messaging services 180 include file transfer services 190, remote procedure call (RPC) services 192, message-oriented services 194 and streaming services 196. File transfer services 190 use applications to enable the copying and receiving of files or other large blocks of data between resources or devices of the netcentric computer system. Remote procedure call (RPC) services 192 is a type of

protocol by which an application sends a request to a remote system to execute a designated procedure using the supplied arguments and return the result to the application.

The message-oriented services 194 refers to the process of distributing data and control through the exchange of records known as messages. In operation, the message-oriented services 194 provide the application developer with a set of simple verbs (e.g., connect, send, receive, and disconnect) that are used to exchange information with other distributed applications. The streaming services 196 use applications to provide the process of transferring time-sensitive data streams (e.g., video and/or audio) in real time. In general, streaming differs from the other types of core messaging services 180 in that it delivers a continuous, one-way stream of data, rather than the relatively short messages of the other types of core messaging services 180. In the preferred embodiment, streaming services 196 are used to deliver video, audio, and/or other real-time content across the Internet or within the netcentric computing system 10.

The specialized messaging services 182 extend the core messaging services 180 to provide additional functionality. Preferentially, the specialized messaging services 180 are designed to extend core messaging services 180 in the following general ways: providing messaging among specialized systems by drawing upon basic messaging capabilities; defining specialized message layouts; defining specialized intersystem protocols; suggesting ways in which messaging draws upon directory and security services to deliver a complete messaging environment.

In the preferred embodiment of the present invention, the specialized messaging services 182 are comprised of the following sub-services: E-mail messaging services 198, database access messaging services 200, object request broker messaging services 202, computer-telephone integration messaging services 204, electronic data interchange messaging services 206 and legacy integration messaging services 208. The E-mail messaging services 198 exchange messages using the store-and-forward messaging style. As known in the art, E-mail messaging services 198 traditionally include a rudimentary form of directory services.

The database access messaging services 200 use applications to provide connectivity for clients to access databases throughout the enterprise. The object request broker messaging services 202 enable objects to transparently make requests of and receive responses from other objects located locally or remotely. Objects communicate through an ORB. An ORB enables client objects to access server objects either locally or remotely over a network and invoke operations (i.e., functions and methods) on the objects.

The computer-telephone integration messaging services 204 use applications to integrate computer systems and telephone systems , thereby coordinating data and telephony activities. In the preferred embodiment, the computer-telephone integration messaging services 204 provide two primary functions: device-specific communication and message mapping.

The electronic date interchange messaging services 206 use applications to support system-to-system messaging among business partners by defining standard message layouts. Companies typically use EDI to streamline commercial transactions within their supply chains. The legacy integration messaging services 208 use applications to provide gateways to mainframe legacy systems so that outdated messaging services can be integrated into the preferred embodiment of the present invention if required.

In the preferred embodiment of the present invention, the communication security services 184 use applications to control access to network-attached resources of the netcentric computing system 10. Combining communication security services 184 with security services in other parts of the netcentric computing system 10 (e.g., application and database layers) results in robust security. The preferred communication security services 184 include encryption services 210, identification/authentication services 212 and access control services 214.

As known in the art, encryption services 210 are applications that encrypt data prior to network transfer to prevent unauthorized interception. The identification/authentication services 212 are applications that determine if the user has the appropriate permissions and either allows or disallows the access when a user requests access to the netcentric computing system 10. The access control

services 214 use applications to verify network access requests by validating that users are who they claim to be. For secure netcentric computing systems 10, one or more authentication mechanisms can be used to validate authorized users and to verify which functions and data they have access to.

Referring to Fig. 8, the virtual resource services 186 use application to proxy or mimic the capabilities of specialized, network-connected resources. This allows a generic network node to emulate a specialized physical device. In this way, network users can interface with a variety of specialized resources. The preferred virtual resource services 186 include fax services 216, file sharing services 218, paging services 220, phone services 222, terminal services 224, printing services 226 and audio/video services 228. The fax services 216 use applications that provide for the management of both inbound and outboard fax transmissions. The file sharing services 218 use application that allow users to view, manage, read, and write files that may be located on a variety of platforms in a variety of locations. The paging services 220 use applications to provide the message formatting and display functionality that allows network nodes to interface with wireless paging systems. The phone services 222 use applications that extend telephony capabilities to the netcentric computing system 10.

The terminal services 224 use applications to allow a client to connect to a non-local host via a network and to emulate the profile (e.g., the keyboard and screen characteristics) required by the host application. The printing services 226 use applications to connect network workstations to shared printers so that various workstations can share printers. In the preferred embodiment, the audio/video services 228 use applications that allow nodes to interact with multimedia data streams. These services may be implemented as audio only, video only, or combined audio/video. Those skilled in the art would recognize that various terminal services 224 may be used in the present invention.

The directory services 188 use applications that manage information about network resources that involves a variety of processes ranging from simple name/address resolution, to the logical integration of heterogeneous systems to create a common view of services, security, and information. The directory

services 188 play a key role in locating and accessing resources in a network, including Internet, intranet and extranet architectures.

Referring once again to Fig. 5, another service used in the preferred netcentric execution architecture 32 is communications fabric services 68. The communications fabric services 68 use applications to extend the traditional client/server computing model by placing intelligence into the physical network, thereby allowing the netcentric computing system 10 to function as a standalone system that provides intelligent shared network services to remote users 79, 120. Referring to Fig. 9, the preferred communications fabric services 68 includes transport services 230 and network media services 232.

As illustrated in Fig. 9, the preferred transport services 230 may be selected from the group consisting of message transport services 234, packet forwarding/Internetworking services 236, circuit switching services 238, transport security services 240, network address allocation services 242 and quality of service services 244. In the preferred embodiment, the transport services 230 are applications that are responsible for establishing, maintaining, and terminating end-to-end communications between users and processes. Connection management provides that the transfer services 230 ensure the delivery of data from sender to receiver, which support the transferring of messages from a process running on one machine to a process running on another machine. In addition, the transport services provide applications that are capable of initiating a connection, terminating a connection, and handling abrupt termination of connections. These services take place for application before and after the data are formatted for transport over the network.

The message transport services 234 are applications that responsible for the end-to-end delivery of messages. In the preferred embodiment, the message transport services 234 include functionalities such as end-to-end data transfer, connection control, reliable transfer, flow control, and multiplexing. The packet forwarding/Internetworking services 236 are applications that transfer data packets and manage the path that data takes through the netcentric computing system 10. The services includes

functionalities such as fragmentation/reassembly, addressing, routing, switching, and multicasting.

The circuit switching services 238 are applications that establish physical circuits for the transfer of such things as circuit-switched voice, fax, and video. The transport security services 240 are applications that perform encryption and filtering of the traffic being passed over the netcentric computing system 10. The network address allocation services 242 are applications that manage the distribution of addresses to network nodes of the netcentric computing system 10. This provides more flexibility compared to having all nodes assigned static addresses. The quality of service services 244 are application designed to deliver a defined network throughout for designated traffic by allocating dedicated bandwidth, prioritizing data traffic, and managing traffic flow. Those skilled in the art would recognize that other transport services 230 may be included in the netcentric computing system 10 depending upon the need of the business enterprise that is using the netcentric computing system 10.

As illustrated in Fig. 9, the preferred network media services 232 of the communications fabric services 68 include media access services 246 and physical media services 248. The network media services 232 provide final framing of data for interfacing with the netcentric computing system 10 and the ability to receive, interpret, and act on signals that are received by the communications fabric services 68. The network media services 234 are also capable of transferring data throughout the netcentric computing system 10.

In the preferred embodiment, the media access services 246 manage the low-level transfer of data between network nodes. The media access services 246 include applications that perform functions such as physical addressing, packet transfer, shared access, flow control, error recovery, and encryption. The physical media services 248 include both the physical connectors and the physical media (wired or wireless) that are used by remote clients 79, 120 to connect with and use the netcentric computing system 10. Those skilled in the art would recognize that several physical media services 248 may be incorporated in the present invention.

For a more detailed discussion of the preferred communication services 66, refer to U.S. Patent Application Serial No. _____, entitled

COMMUNICATION SERVICE ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS, which is incorporated herein by reference, in its entirety.

Referring back to Fig. 5, as previously set forth the preferred netcentric execution architecture 32 also includes environment services 72. As illustrated in Fig. 10, the preferred environment services 72 may be selected from the group consisting of runtime services 250, system services 252, application services 254, component framework services 256 and operating system services 258. As set forth in detail below, the environment services 72 provide miscellaneous application and system level services that do not deal directly with managing the user interface, communicating to other programs, or accessing data.

The runtime services 250 use applications to convert non-compiled computer languages into machine code during the execution of an application. Two sub-services within the runtime services 250 comprise language interpreter services 260 and virtual machine services 262. The language interpreter services 260 decompose fourth generation and/or scripting languages into machine code (executable code) at runtime. The virtual machine services 262 are implemented in applications on top of an operating system and are used to run applications. The virtual machine services 260 provide a layer of abstraction between applications and the underlying operating system and are used to support operating system independence.

The system services 252 are applications that other applications use to perform system-level functions. The preferred system services 252 include system security services 264, profile management services 266, environment verification services 268 and task and memory management services 270. The system security services 264 allow applications to interact with the operating system's native security mechanism. The most common basic services include the ability to login, logoff, authenticate to the operating system, and enforce access control to system resources and executables.

The profile management services 266 are applications that are used to access and update local or remote systems, users, or application profiles. User profiles, for example, can be used to store a variety of information such as the user's language and color preferences to basic job function information that may be used

by integrated performance support or workflow services. The environment verification services 268 use applications to ensure functionality by monitoring, identifying, and validating environment integrity prior and during program execution. (e.g., free disk space, monitor resolution, and correct version). The task and memory management services 270 are applications that allow other applications and/or events to control individual computer tasks or processes and manage memory. As such, the task and memory management services 270 provide services for scheduling, starting, stopping, and restarting both client and server tasks (e.g., software agents).

The application services 254 are miscellaneous services that applications can use for common functions. These common functions can apply to one application or can be used across multiple applications. The preferred application services 254 include application security services 272, error handling/logging services 274, state management services 276, code table services 278, active help services 280, file services 282, application integration interface services 284 and common services 286.

The applications security services 272 are applications that provide security services associated with specific applications, including user access services, data access services, and function access services. The error handling/logging services 274 are applications that support the handling of fatal and nonfatal hardware and software errors for other applications. In addition, the error handling/logging services 274 support the logging of informational error and warning messages. The state management services 276 are applications that enable information to be passed or shared among windows and/or web pages and/or across multiple applications within the netcentric computing system 10.

The code table services 278 are applications that enable other applications to utilize externally stored parameters and validation rules. The active help services 280 are applications that enable other applications to provide assistance to users for a specific task or set of tasks. The file services 282 are applications that enable users to interact with files on the netcentric computing system 10. The application integration interface services 284 are applications that provide a method or gateway for passing context and control of information to an external application. The

common services 286 should be construed herein as a catch-all category for additional reusable applications that are useful across a set of applications (e.g., Date Routines, Time Zone Conversions, and Field Validation Routines).

The component framework services 256 are applications that provide an infrastructure for building components that can communicate within an application and across other applications, on the same machine or on multiple machines across a network, to work together. A few examples are COM/DOM and CORBA, which are two leading component industry standards. These standards define how components should be built and how the components should communicate with each other.

The operating system services 258 are the underlying services such as multitasking, paging, memory allocation, which are typically provided by today's modern operating systems, such as Windows® based operating systems from Microsoft. Where necessary, an additional layer or APIs may be provided to gain either operating system independence or a higher level of abstraction for application programmers. Those skilled in the art would recognize that several operating system services 258 may be used in the present invention and that the netcentric computing system 10 is not limited to the use of a particular operating system.

For a more detailed discussion of the preferred environment services 72, refer to U.S. Patent Application Serial No. _____, entitled ENVIRONMENT SERVICE ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS, which is incorporated by reference herein, in its entirety.

Referring once again to Fig. 5, as previously set forth the netcentric execution architecture 32 of the netcentric computing system 10 includes transaction services 70. The transaction services 70 are applications that provide the transaction integrity mechanism for the netcentric computing system 10. This allows all data activities within a business event to be grouped as a single, logical unit of work. As illustrated in Fig. 11, the preferred transaction services 70 may be selected from the group consisting of transaction monitor services 290, resource management services 292, transaction management services 294 and transaction partitioning services 296.

The transaction monitor services 290 are the applications that provide the primary interface through which applications invoke the transaction services 70 and receive status and error information. The transaction monitor services 290, in conjunction with the information services 64 and the communication services 66, provide for load balancing across processors or machines and location transparency for distributed transaction processing. Those skilled in the art would recognize that the type of transaction monitor services 290 used in the netcentric computing system 10 will vary depending on the needs of each particular business enterprise.

The resource management services 292 are applications that provide concurrency control and integrity for a singular data resource (e.g., a database or a file system). Integrity is guaranteed by ensuring that an update is completed correctly and entirely or not at all. The resource management services 292 use locking, commit, and roll-back services and are integrated with the transaction management services 294, which are set forth below.

The transaction management services 294 are applications that coordinate transactions across one or more resource managers either on a single machine or multiple machines within the netcentric computing system 10. The transaction management services 294 ensure that all resources for a transaction are updated or, in the case of an update failure on any one resource, all updates are rolled back. This service also allows multiple applications to share data with integrity.

The transaction partitioning services 296 are applications that provide support for mapping a single logical transaction in an application into the required multiple physical transactions. For example, in a package or legacy-rich environment, the single logical transaction of changing a customer address may require the partitioning and coordination of several physical transactions to multiple application systems or databases to update the change of address. The transaction partitioning services 296 provide the netcentric computing system 10 with a single transaction view, while still allowing multiple applications or databases to be updated seamlessly.

Referring once again to Fig. 5, as previously set forth the netcentric execution architecture 32 of the netcentric computing system 10 further includes base services 74. As illustrated in Fig. 12, the preferred base services 74 may be

selected from the group consisting of web server services 300, push/pull services 302, batch services 304, base report services 306 and workflow services 308. The base services 74 use applications to provide support for delivering applications to a wide variety of users over the Internet connection 107, intranet connection 106 and extranet connection 110.

The web server services 300 are applications that enable organizations to manage and publish information and deploy netcentric software applications over the Internet connection 107, Intranet connection 106 and extranet connection 110. These services preferentially support: managing documents in common formats such as HTML, Microsoft Word, etc.; handling client requests for HTML pages; processing scripts such as common gateway interface (CG1) or Active Server Pages (ASP); and caching web pages. Those skilled in the art would recognize that the web server services 300 will vary from application to application, depending on the demands placed on the netcentric computing system 10.

The push/pull services 302 are applications that allow for interest in a particular piece of information to be registered and then changes or new information to be communicated to the subscriber list. Depending upon requirements, synchronous or asynchronous push/pull services may be required in the netcentric computing system 10. Synchronous push/pull services provide a mechanism for applications to be notified in real time if a subscribed item changes (e.g., stock ticker). Asynchronous push/pull services do not require that a session-like connection be present between the subscriber and the service or application providing information.

The batch services 304 are applications used to perform large-scale repetitive processing where no user involvement is required as well as reporting. Preferentially, areas for design attention include scheduling, recovery/restart, use of job streams, and high availability (e.g., 24-hour running). In addition, close attention must be paid to performance as the batch services 304 usually must be processed within strict batch windows.

Although not illustrated in Fig. 12, the batch services 304 preferentially are selected from the group consisting of driver services, restart/recovery services, batch balancing services and batch report services. These services provide the

control structure and framework for the batch services 304. The restart/recovery services are used to automatically recover and restart batch programs if any of the programs should fail during execution. The batch balancing services support the tracking of run-to-run balances and totals for the batch services 304. The batch report services are used to summarize and communicate information, using either printed paper or on-line reporting.

The base report services 306 are applications for simplifying the construction and delivery of reports or generated correspondence. The base report services 306 help to define reports and to electronically route reports to allow for on-line review, printing, and/or archiving. Further, the base report services 306 also support the merging of application data with predefined templates to create letters or other printed correspondence. Some illustrative applications of features the base report services 306 include driver services, report definition services, report building services and report distribution services.

The workflow services 308 are applications that control and coordinate the tasks that must be completed to process a business event. In operation, the workflow services 308 enable tasks within a business process to be passed among the appropriate participants, in the correct sequence, and facilitates the completion of the tasks within set time frames and budgets. Task definition includes the actions required as well as work folders containing forms, documents, images, and transactions. The workflow services 308 uses business process rules, routing information, role definitions and queues.

In the preferred embodiment, the workflow services 308 are applications that provide a mechanism that defines, monitors, and controls the sequence of work electronically. The applications of the workflow services 308 are typically provided by the servers 92, 96, 98, as they often coordinate activities among multiple users or multiple computers. Although not illustrated in Fig. 12, the workflow services 308 may be selected from the group consisting of role management services, route management services, rule management services and queue management services. Those skilled in the art would recognize that other workflow services 308 may be used in the netcentric computing system 10 to process various requests among users.

Role management services are applications that provide for the assignment of tasks to roles that can be mapped to individuals within the business. Route management services are applications that enable the routing of tasks to the next role. The rule management services support the routing of workflow activities by providing the intelligence necessary to determine which routes are appropriate given the state of a given process and knowledge of the organization's workflow processing rules. Finally, the queue management services provide access to the workflow queues that are used to process tasks in the netcentric computing system 10.

For a more detailed discussion of the preferred base services 74, refer to U.S. Patent Application No. _____, entitled BASE SERVICE ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS, which is incorporated herein by reference, in its entirety.

Referring once again to Fig. 5, as previously set forth, the netcentric execution architecture 32 of the netcentric computing system 10 includes business logic services 76. As illustrated in Fig. 13, the preferred business logic services 76 may be selected from the group consisting of interface logic 310, application logic 312 and database abstraction 314. The interface logic 310 includes applications that interpret and map the actions of users into business logic processing activities. With the assistance of the presentation services 62, the interface logic 310 provides the linkage that allows users to control the flow of processing within the application.

In the preferred embodiment, the application logic 312 is the expression of business rules and procedures (e.g., the steps and rules that govern how a sales order is fulfilled). As such, the application logic 312 includes applications that have the control structure that specifies the flow for processing of business events and user requests. The isolation of control logic facilitates change and adaptability of applications to changing business processing flows.

Data abstraction 314 includes applications that provide the applications with a more logical view of information, further insulating applications from physical information storage considerations. The developers of the business logic services 76 should preferentially be shielded from the details and complexity of other

architecture services (e.g., information services or component services), and other business logic for that matter.

For netcentric computing systems 10, it is important to decide whether the business logic services 76 will be separate from the presentation logic services 62 and the information services 64. Separation of the business logic services 76 into its own tier is often done using an application server 96, as illustrated in Fig. 4. In this type of an environment, although some business rules such as field validation might still be tightly coupled with the presentation logic services 62, the majority of the business logic services 76 is separate, usually residing on the application server 96. It is also important to decide whether the business logic services 76 should be packaged as components to maximize software reuse and to streamline software distribution.

Another factor to consider is how the business logic services 76 are distributed between the client 78, 120 and the server(s) 92, 96, 98 where the business logic services 76 are stored and where the business logic services 76 are located when the software application is being executed. There are several ways to distribute the business logic services 76: business logic applications can be stored on the server(s) 92, 96, 98 and executed on the server(s) 92, 96, 98; business logic applications can be stored on the server(s) 92, 96, 98 and executed on the client 78, 120; business logic applications can be stored and executed on the client 78, 120; and some business logic applications can be stored and executed on the server (s), and some business logic can be stored and executed on the client.

Having the business logic applications stored on the servers 92, 96, 98 enables developers to centrally maintain application code, thereby eliminating the need to distribute software to client machines when changes to the business logic applications occur. If all the business logic applications execute on the server, the application on the client will make requests to the server whenever it needs to execute a business function. This could increase network traffic, which may degrade application performance. On the other hand, having the business logic applications execute on the client may require longer load times when the application is initially launched. However, once the application is loaded, most processing is done on the client until synchronization with the server is needed.

This type of an architecture might introduce complexities into the application that deal with the sharing of, and reliance on central data, across many users.

If the business logic services 76 are stored and executed on the client 78, 79, 120, software distribution options must be considered. In the preferred embodiment, one option is to have a system administrator or the user physically install new applications and update existing applications on each client machine. Another option is to use an application that performs automatic software distribution functions. A third option is to package the applications into ActiveX controls, utilizing the automatic install/update capabilities available with ActiveX controls if the application is launched from a web browser.

Preferentially, Internet applications used in the netcentric computing system 10 house a majority of the business processing logic on the server(s) 92, 96, 98, thereby supporting a thin-client model. However, as technology evolves, this balance may shift, allowing business logic application code bundled into components to be either downloaded at runtime or permanently stored on remote client workstations. (client-side business logic applications are supported through the use of Java applets, JavaBeans, Plug-ins and JavaScript from Sun/Netscape, and ActiveX controls and VBScript from Microsoft.)

Referring to Fig. 2, the preferred netcentric computing system 10 also includes the operations architecture 36. In the preferred embodiment, the operations architecture 36 operates and manages the overall operation of the netcentric computing system 10. The operations architecture 36 provides a combination of tools, support services, procedures and controls that are required to keep a production system up and running well.

As illustrated in Fig. 14, the operations architecture 36 supports the netcentric execution architecture 32 and the development architecture 34. The preferential tools of the operations architecture 36 may be selected from the group consisting of software distribution tools 320, configuration and asset management tools 322, fault management and recovery management tools 324, capacity planning tools 326, performance management tools 328, license management tools 330, remote management tools 332, event management tools 334, monitoring and tuning tools 336, security tools 338, user administration tools 340, production control tools

342 and help desk tools 344. The operations architecture 36 differs from the netcentric execution architecture 32 in that its primary users are systems administrators and production support personnel. Each of the tools of the operations architecture 36 is set forth in greater detail below.

The software distribution tool 320 include applications that perform automated delivery to, and installation of, applications on servers and end user devices (e.g., workstations, kiosks, etc.). In the preferred embodiment, the software distribution tool 320 is capable of delivering software updates and software inside the business enterprise 90 as well as for its extended ones, i.e., suppliers 108 and remote clients 79 that include customers.

To manage the netcentric computer system 10 effectively, the business enterprise 90 must have a solid understanding of what is where, and they must maintain rigor in keeping track of modifications. The configuration and asset management tools 322 provide applications that keep track of where information is located as well as the content of the information. Some examples of information that these applications may keep track of include product licensing information, warranty information, vendor names, logical and physical device information (such as total capacity and current utilization), product configuration tracking, software and data version levels, network configuration parameters, physical location and accounting information. Those skilled in the art would recognize that several configuration and asset management applications may be used in the present invention, depending on the needs of the enterprise.

The fault management and recovery management tools 324 provide applications that assist in the diagnosis and correction of system faults in the netcentric computing system 10. Common faults may include networks, server, workstation, or even application-level faults. Fault diagnosis may further include applications for isolation; viewing of host, server, and workstation error logs; and determining the software and data versions and configurations of affected machines.

The capacity planning tools 326 are applications that focus on components of a particular environment in the netcentric computing system 10, such as the network, physical space, and processing power, to understand the need to change the capacity of those components based on the needs of the business enterprise 90.

In the preferred embodiment, the capacity planning tools 326 monitor components that are considered to be heavily sensitive to changes in computing resource usage. The capacity planning tools 326 may use historical management data combined with estimates for growth or changes to configuration to simulate the ability of different system configurations to meet capacity needs. Those skilled in the art would recognize that various capacity planning tools 326 may be used in the present invention.

The performance management tools 328 of the operations architecture 36 are applications that monitor the performance of computing resources in the netcentric computing system 10. Performance issues are no longer confined to the network or to the central processing unit for netcentric computing systems 10. Performance is preferentially viewed in an end-to-end manner, accounting for all factors that affect the performance of the netcentric computing system 10, relative to user requests. The license management tools 330 of the operations architecture 36 includes applications that focus on guaranteeing compliance with software licensing agreements. As known in the art, several different methods exist to verify compliance with software agreements and may be used in the present invention.

The remote management tools 332 of the operations architecture 36 provide applications that allow support personnel to "control" a user's desktop over a network so that they do not need to be physically present at a workstation to diagnose problems. As known in the art, once control of the desktop is established, screen updates for the controlled desktop are displayed at both locations. The support person is then effectively sitting at the workstation he/she controls and can do necessary diagnostics. The event management tools 334 of the operations architecture 36 include applications that manage events that other applications and systems software generate during operation. Common event-handling mechanisms are required to provide information to management in a simple, consistent format and to forward information on important events for management purposes.

The monitoring and tuning tools 336 of the operations architecture 36 are applications that focus on the number of devices and the geographic disparity of devices that may be used in the netcentric computing system 10. The number of events generated in the system rises due to the increased complexity. Devices such

as client machines, network components, and servers generate events on startup or failure to periodically report device status. The monitoring and tuning tools 336 allow the netcentric computing system 10 to quickly and easily adapt to the various devices connected to, and using, the netcentric computing system 10.

The security tools 338 of the operations architecture 36 comprise applications that provide various security measures for the netcentric computing system 10. The security concerns of Internet based environments have been widely publicized. Although the security requirements for a netcentric computing system 10 will constantly be evolving as new security breaches are discovered, there are several tools that can help provide reasonable levels of security.

The user administration tools 340 of the operations architecture 36 include applications that provide the tools to the netcentric computing system 10 that allow the system to keep track of users. Adding a user to the netcentric computing system 10 may require adding a user to the network, one or more server operating systems, one or more database systems, an e-mail system, and an existing host-based system. Those skilled in the art would recognize that there are several different types of tools that fall under the penumbra of user administration tools 340 and that the tools set forth above are for illustrative purposes only.

The production control tools 340 of the operations architecture 36 include applications that perform scheduling processes across a distributed environment. As such, they allow users to view and monitor the day-to-day operations of the business enterprise 90. Those skilled in the art would recognize that the particular type of production control tools 340 used in the present invention will vary depending on the needs of the business enterprise 90.

The help desk tools 344 of the operations architecture 36 includes applications that route users of the netcentric computing system 10 to the appropriate areas or personnel for help. Unless the help desk tool 344 is included there is a risk that the user may be given information that is incorrect, forwarded to the wrong department or otherwise mishandled in the netcentric computing system 10. Those skilled in the art would recognize that the exact makeup of the help desk tools 344 will vary depending on the needs of the particular business enterprise 90.

For a detailed discussion of the preferred operations architecture 36, refer to U.S. Patent Application Serial No. _____, entitled OPERATIONS ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS, which is incorporated herein by reference, in its entirety.

While the invention has been described in its currently best known modes of operation and embodiments, other modes and embodiments of the invention will be apparent to those skilled in the art and are contemplated. For other features, advantages and combinations of the present invention refer to U.S. Provisional Application Serial No: 60/156,962, NETCENTRIC AND CLIENT/SERVER COMPUTING, which is herein incorporated by reference, in its entirety.

Docket No. 50277-0939

What is claimed is:

1. An architecture for a netcentric computing system, comprising:

a business solutions architecture layer;

an application architecture layer in communication with said business solutions layer;

a technical architecture layer in communication with said application architecture layer; and

a platform architecture layer in communication with said technical architecture layer.

2. The architecture for a netcentric computing system of claim 1, wherein said business solutions architecture layer includes an environment layer, a business requirements layer and a data architecture layer.

3. The architecture for a netcentric computing system of claim 1, wherein said technical architecture layer includes an infrastructure layer and a system software layer.

4. The architecture for a netcentric computing system of claim 1, wherein said platform architecture layer includes a hardware/network layer

5. The architecture for a netcentric computing system of claim 3, wherein said system software layer includes a netcentric execution architecture, a development architecture and an operations architecture.

6. The architecture for a netcentric computing system of claim 5, wherein said netcentric execution architecture includes presentation services, information services, communication services, communication fabric services, transaction services, environment services, base services, and business logic services.

7. The architecture for a netcentric computing system of claim 5, wherein said development architecture includes a common user interface, at least one process management tool, at least one personal productivity tool, at least one

quality management tool, at least one systems building tool, at least one environment management tool, at least one program and project management tool, at least one team productivity tool and at least one information management tool.

8. The architecture for a netcentric computing system of claim 5, wherein said operations architecture includes software distribution tools, configuration and asset management tools, fault management and recovery management tools, capacity planning tools, performance management tools, license management tools, remote management tools, event management tools, monitoring and tuning tools, security tools, user administration tools, production control tools and help desk tools.

9. The architecture for a netcentric computing system of claim 2, wherein said environment layer includes at least one application for processing business-level processes.

10. The architecture for a netcentric computing system of claim 2, wherein said business requirements layer includes at least one application for providing products and services to the users of said netcentric computing system.

11. The architecture for a netcentric computing system of claim 2, wherein said data architecture layer includes applications for handling data requirements of users of said netcentric computing system.

12. The architecture for a netcentric computing system of claim 3, wherein said infrastructure layer supports applications of the application architecture that are used by multiple applications in said netcentric computing system.

13. The architecture for a netcentric computing system of claim 4, wherein said hardware/network layer includes at least one server that is connected with an Internet connection.

14. The architecture for a netcentric computing system of claim 13, wherein said server is a web server.

15. The architecture for a netcentric computing system of claim 1, wherein said application architecture layer includes at least one application that provides automated support for a business transaction that involves the transfer of data to or from said netcentric computing system to a user.

16. The architecture for a netcentric computing system of claim 7, wherein said quality management tools may be selected from the group consisting of quality function deployment tools, measurement tools, statistical tools and improvement tools.

17. The architecture for a netcentric computing system of claim 7, wherein said system building tools may be selected from the group consisting of analysis and design tools, reverse engineering tools, construction tools, testing tools and configuration management tools.

18. The architecture for a netcentric computing system of claim 7, wherein said environment management tools may be selected from the group consisting of service management tools, systems management tools, update management tools and service planning tools.

19. The architecture for a netcentric computing system of claim 7, wherein said program and project management tools may be selected from the group consisting of planning tools, scheduling tools, tracking tools and reporting tools.

20. The architecture for a netcentric computing system of claim 7, wherein said team productivity tools may be selected from the group consisting of e-mail tools, teamware tools, publishing tools, group calendar tools and methodology browsing tools.

21. The architecture for a netcentric computing system of claim 7, wherein said information management tools includes folder management tools and repository management tools, wherein said folder management tools and said

repository management tools provide access to a common repository of development objects, design documents, source code and data files.

22. The architecture for a netcentric computing system of claim 6, wherein said presentation services may be selected from the group consisting of desktop manager services, direct manipulation services, forms services, input device services, report and print services, user navigation services, web browser services and window system services.

23. The architecture for a netcentric computing system of claim 6, wherein said information services includes database services and document services.

24. The architecture for a netcentric computing system of claim 23, wherein said database services includes storage services, indexing services, security services, access services and replication/synchronization services.

25. The architecture for a netcentric computing system of claim 23, wherein said document services includes storage services, indexing services, security services, access services, replication/synchronization services and versioning services.

26. The architecture for a netcentric computing system of claim 6, wherein said communication services may be selected from the group consisting of core messaging services, specialized messaging services, communication security services, virtual resource services and directory services.

27. The architecture for a netcentric computing system of claim 26, wherein said communications services include file transfer services, remote procedure call services, message-oriented services and streaming services.

28. The architecture for a netcentric computing system of claim 26, wherein said specialized messaging services may be selected from the group consisting of e-mail messaging services, database access messaging services, object request broker messaging services, computer-telephone integration messaging

services, electronic data interchange messaging services and legacy integration messaging services.

29. The architecture for a netcentric computing system of claim 26, wherein said communication security services may be selected from the group consisting of encryption services, identification/authentication services and access control services.

30. The architecture for a netcentric computing system of claim 26, wherein said virtual resource services may be selected from the group consisting of fax services, file sharing services, paging services, phone services, terminal services, printing services and audio/video services.

31. The architecture for a netcentric computing system of claim 6, wherein said communication fabric services include transport services and network media services.

32. The architecture for a netcentric computing system of claim 31, wherein said transport services may be selected from the group consisting of message transport services, packet forwarding/Internetworking services, circuit switching services, transport security services, network address allocation services and quality of service services.

33. The architecture for a netcentric computing system of claim 31, wherein said network media services includes media access services and physical media services.

34. The architecture for a netcentric computing system of claim 6, wherein said environment services may be selected from the group consisting of runtime services, system services, application services, component framework services and operating system services.

35. The architecture for a netcentric computing system of claim 34, wherein said runtime services includes language interpreter services and virtual machine services.

36. The architecture for a netcentric computing system of claim 34, wherein said system services may be selected from the group consisting of system security services, profile management services, environment verification services and task and memory management services.

37. The architecture for a netcentric computing system of claim 34, wherein said application services may be selected from the group consisting of application security services, error handling/logging services, state management services, code table services, active help services, file services, application integration interface services and common services.

38. The architecture for a netcentric computing system of claim 6, wherein said transaction services may be selected from the group consisting of transaction monitor services, resource management services, transaction management services and transaction partitioning services.

39. The architecture for a netcentric computing system of claim 6, wherein said base services may be selected from the group consisting of web server services, push/pull services, batch services, base report services and workflow services.

40. The architecture for a netcentric computing system of claim 39, wherein said batch services may be selected from the group consisting of driver services, restart/recovery services, batch balancing services and batch report services.

41. The architecture for a netcentric computing system of claim 39, wherein said workflow services may be selected from the group consisting of role management services, route management services, rule management services and queue management services.

42. The architecture for a netcentric computing system of claim 6, wherein said business logic services may be selected from the group consisting of interface logic, application logic and database abstraction.

43. The architecture for a netcentric computing system of claim 5, wherein said operations architecture includes a plurality of operations tools, wherein said operations tools may be selected form the group consisting of software distribution tools, configuration and asset management tools, fault management and recovery tools, capacity planning tools, performance management tools, license management tools, remote management tools, event management tools, monitoring and tuning tools, security tools, user administration tools, production control tools and help desk tools.

44. A netcentric computing system, comprising:

a business solutions architecture layer including an environment layer, a business requirements layer and a data architecture layer;

an application architecture layer in communication with said business solutions layer;

a technical architecture layer that includes an infrastructure layer and a system software layer in communication with said application architecture layer, said system software layer including a netcentric execution architecture, a development architecture and an operations architecture; and

a platform architecture layer in communication with said technical architecture layer, wherein said platform architecture layer includes a hardware/network layer.

45. The netcentric computing system of claim 44, wherein said netcentric execution architecture includes presentation services, information services, communication services, communication fabric services, transaction services, environment services, base services, and business logic services.

46. The netcentric computing system of claim 44, wherein said development architecture includes a common user interface, at least one process management tool, at least one personal productivity tool, at least one quality management tool, at least one systems building tool, at least one environment management tool, at least one program and project management tool, at least one team productivity tool and at least one information management tool.

47. The netcentric computing system of claim 44, wherein said operations architecture includes software distribution tools, configuration and asset management tools, fault management and recovery management tools, capacity planning tools, performance management tools, license management tools, remote management tools, event management tools, monitoring and tuning tools, security tools, user administration tools, production control tools and help desk tools.

ABSTRACT

An architecture for a netcentric computing system is disclosed that includes a business solutions architecture layer that further includes an environment layer, a business requirements layer and a data architecture layer. An application architecture layer is in communication with the business solutions layer. Further, a technical architecture layer is in communication with the application architecture layer, wherein the technical architecture layer includes an infrastructure layer and a system software layer. A platform architecture layer is in communication with the technical architecture layer, wherein the platform architecture layer includes a hardware/network layer.

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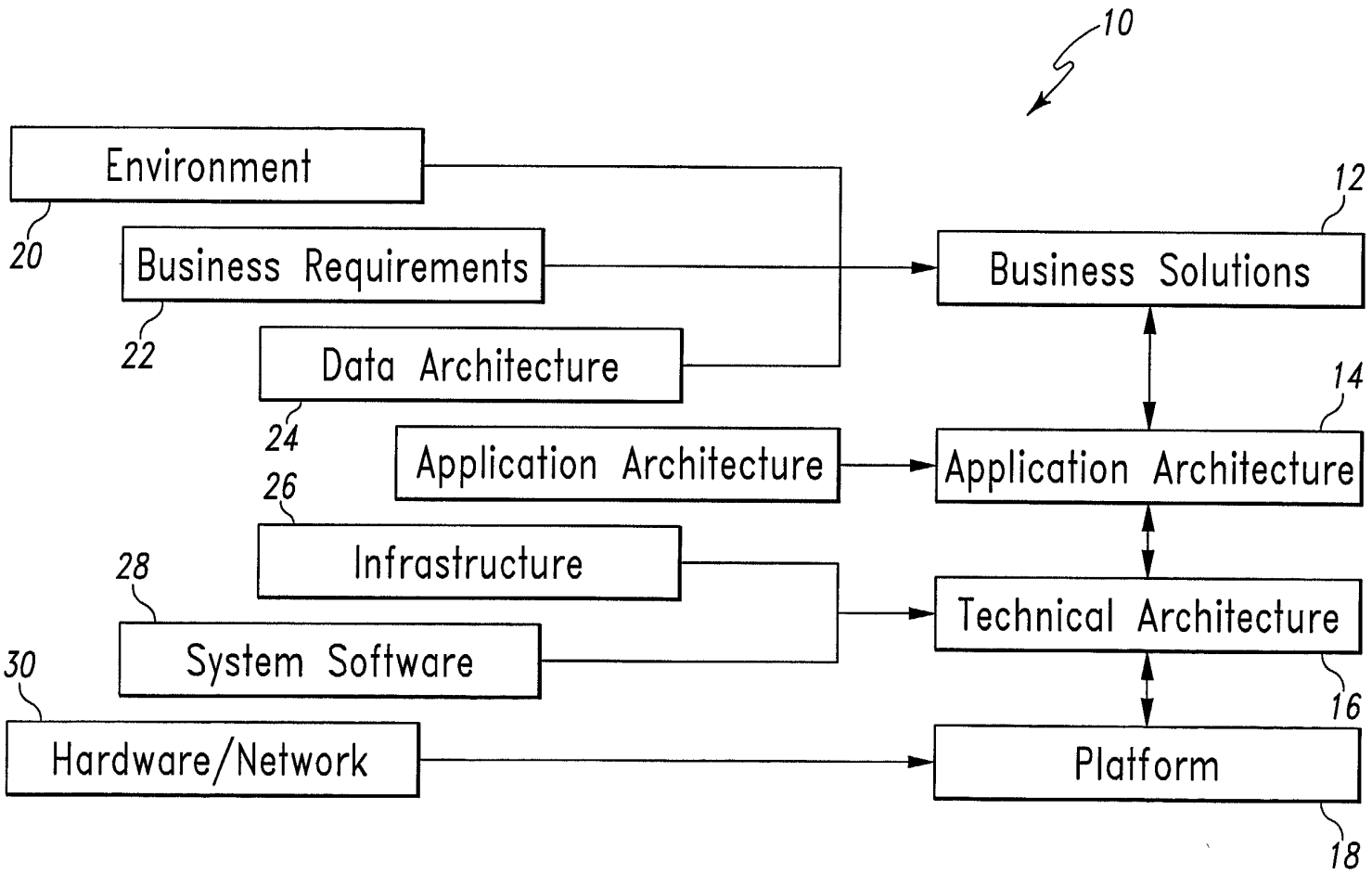
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Environment
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Business Requirements
22
Data Architecture
24
Application Architecture
26
Infrastructure
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System Software
30
Hardware/Network
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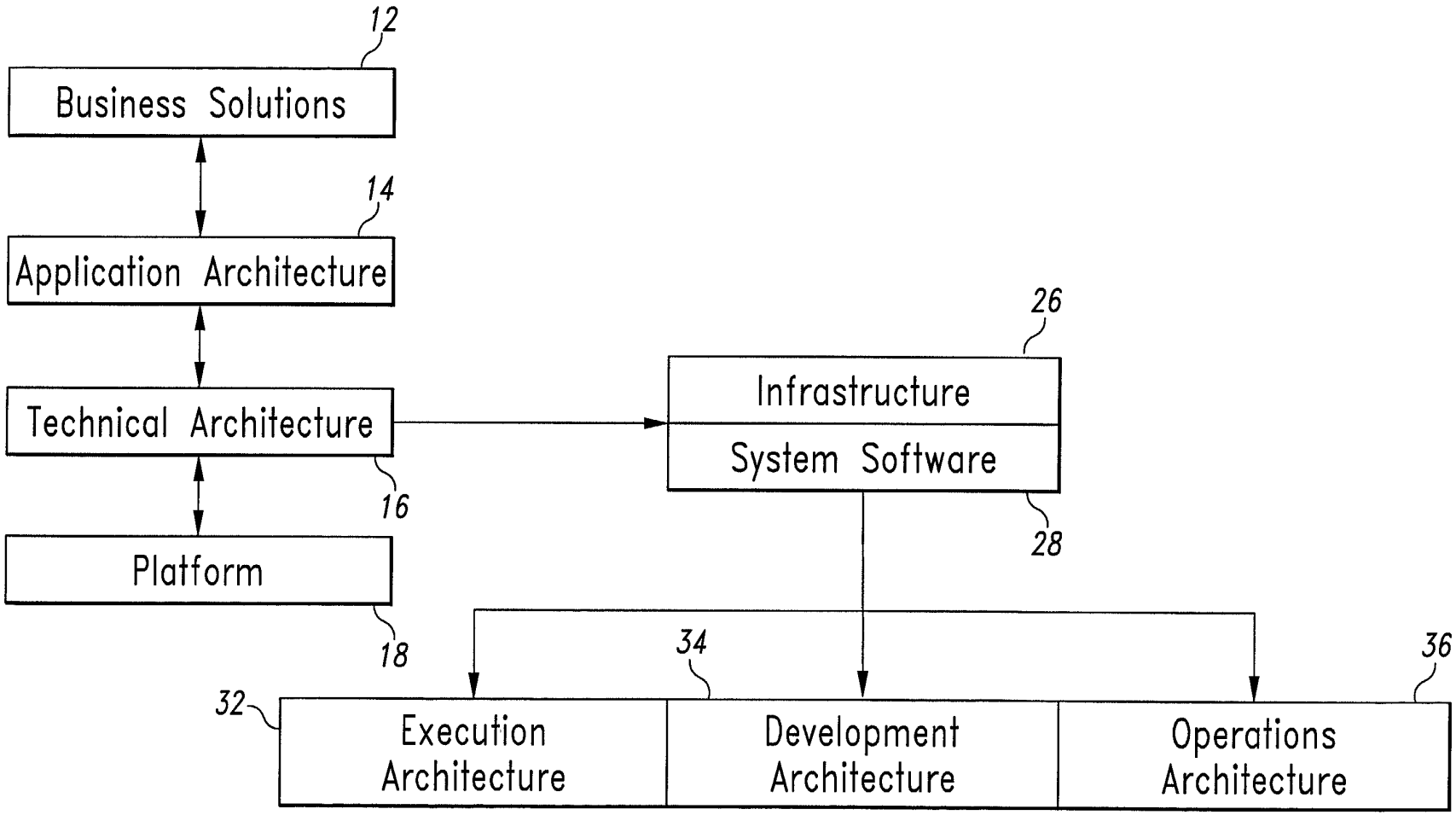
Business Solutions
14
Application Architecture
Technical Architecture
16
Platform
18

Fig. 1


12
Business Solutions
14
Application Architecture
Technical Architecture
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Platform
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26
Infrastructure
System Software
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34
36
32
Execution Architecture
Development Architecture
Operations Architecture

Fig. 2

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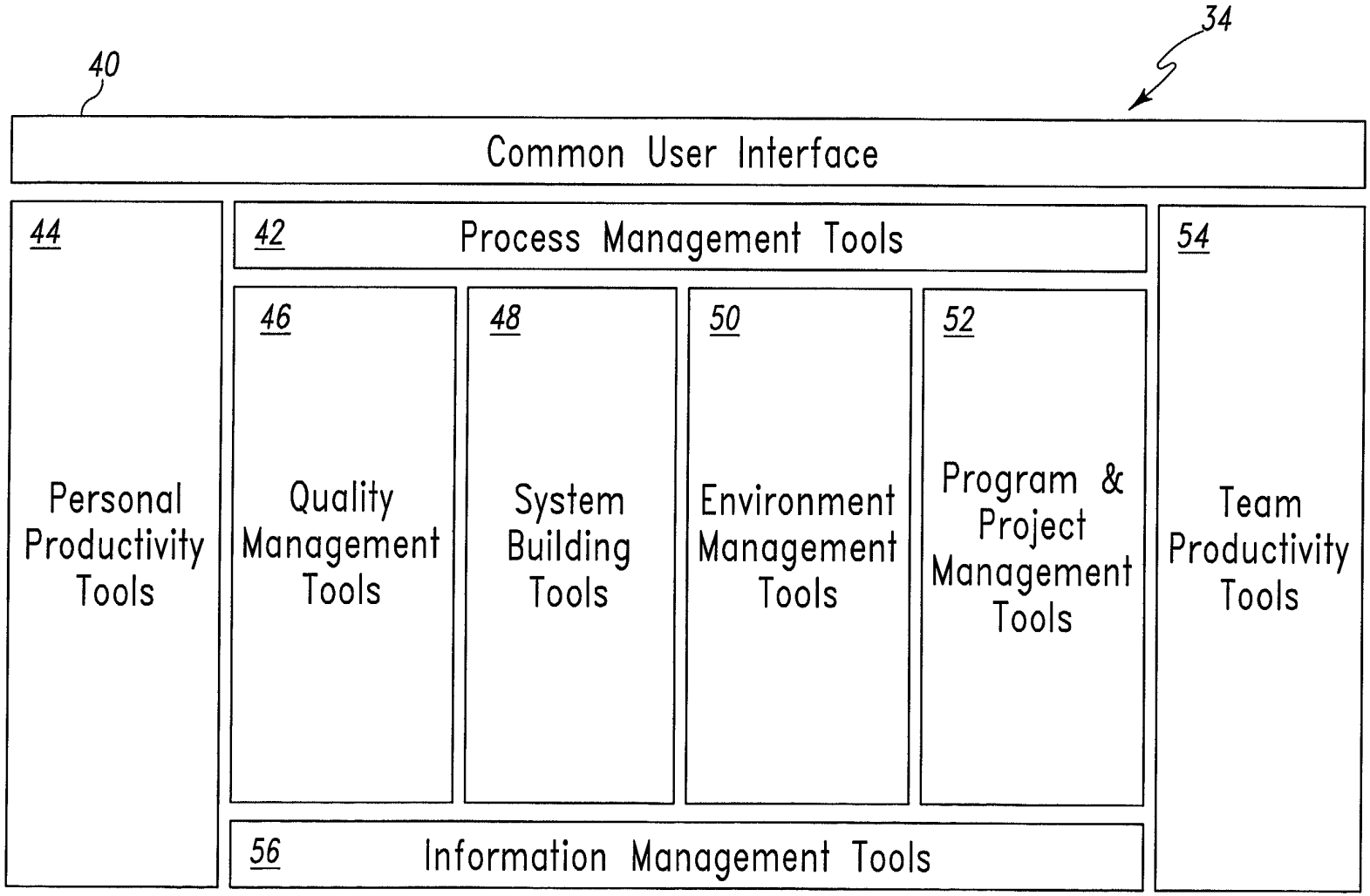
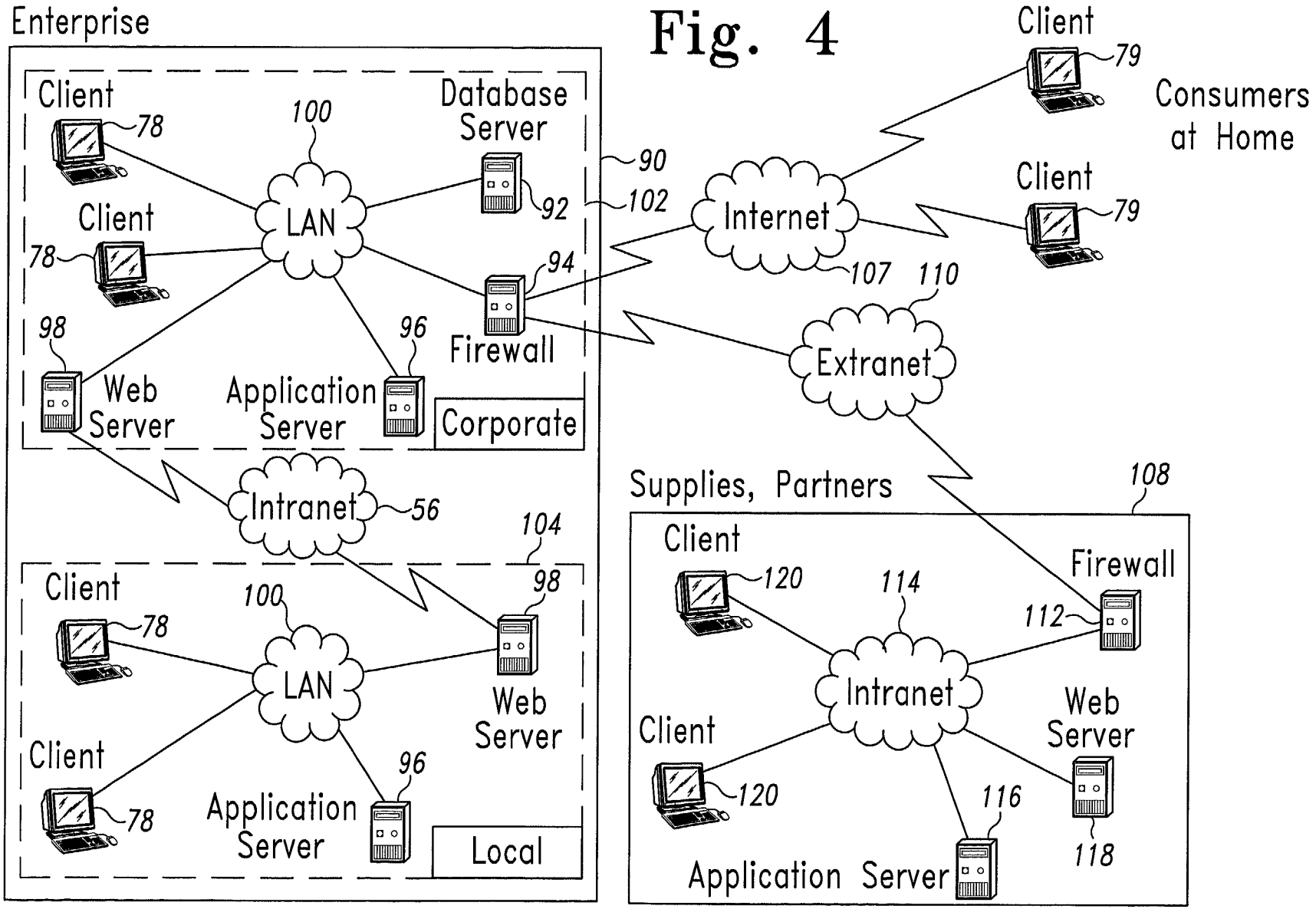


Fig. 3

Fig. 4


Enterprise
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100
Database Server
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92
102
Client
78
LAN
Internet
Client
79
Consumers at Home
94
Client
79
107
110
98
96
Firewall
Web Server
Application Server
Corporate
Extranet
Intranet
56
104
Supplies, Partners
108
Client
120
114
Firewall
112
Client
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100
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LAN
Intranet
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Web Server
Client
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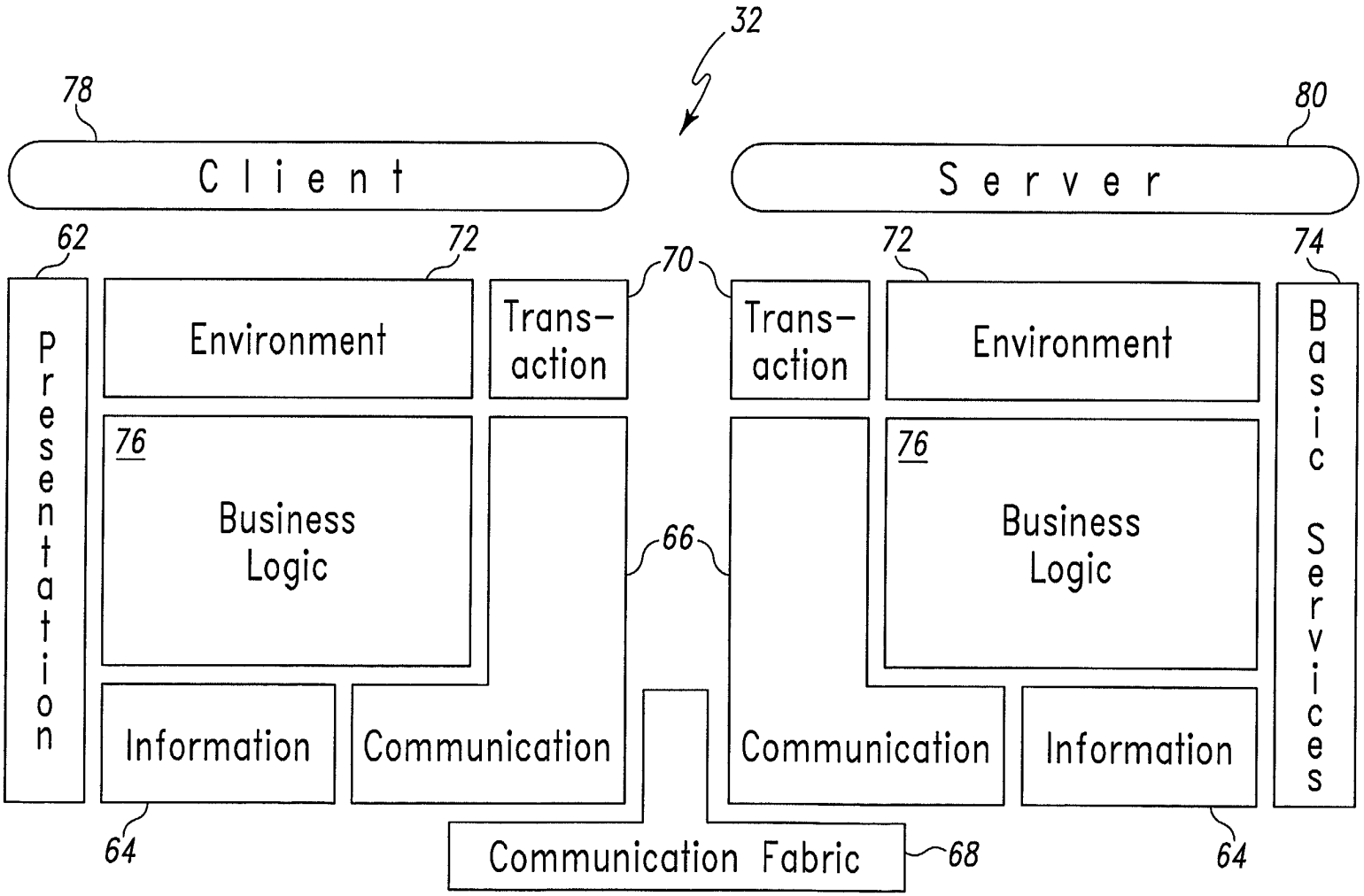
96
116
Application Server
118
Application Server
Local


32
78
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Client
Server
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72
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72
74
Presentation
Environment
Trans-action
Trans-action
Environment
Basic Services
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Business Logic
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76
Business Logic
Information
Communication
Communication
Information
64
Communication Fabric
68
64

Fig. 5

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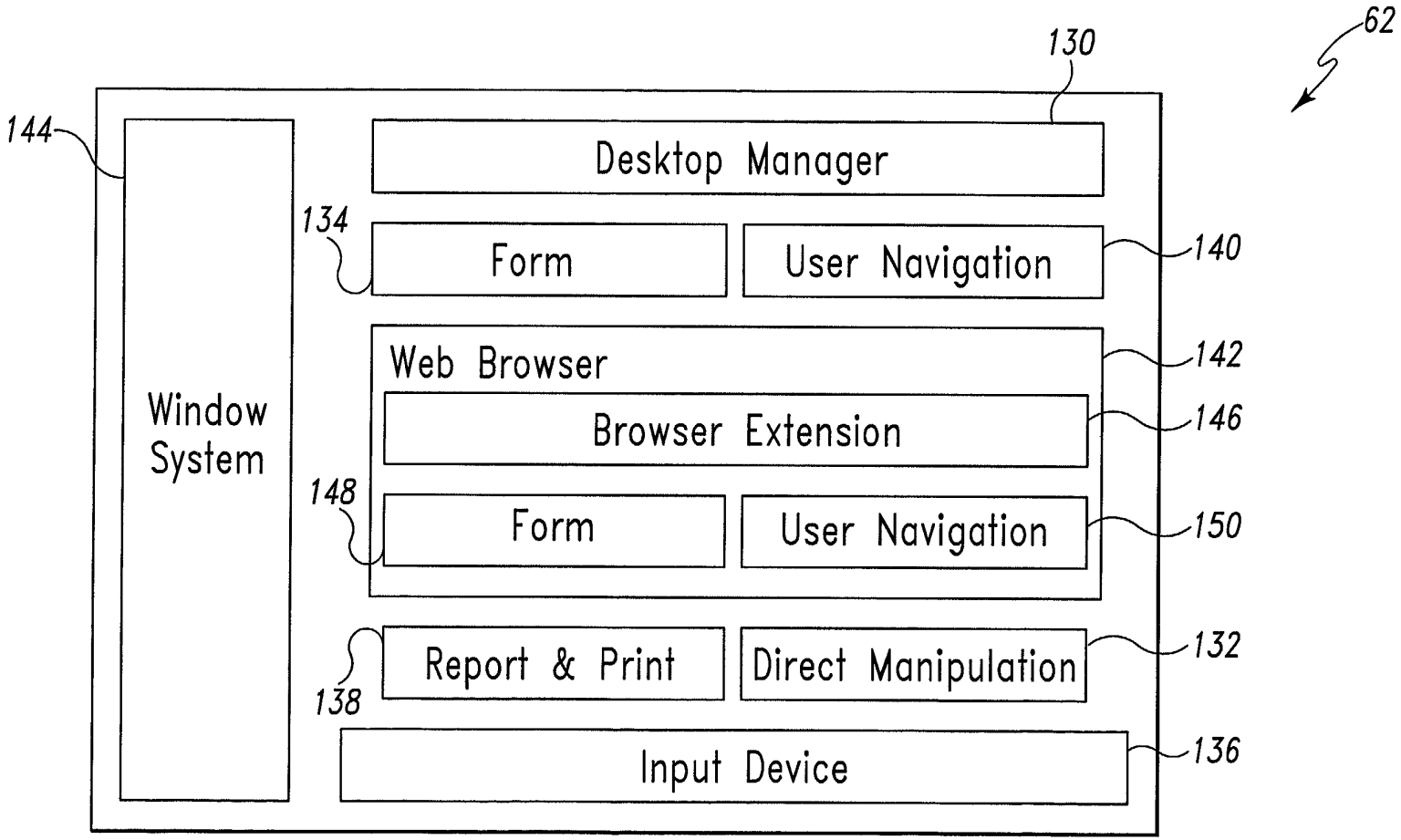
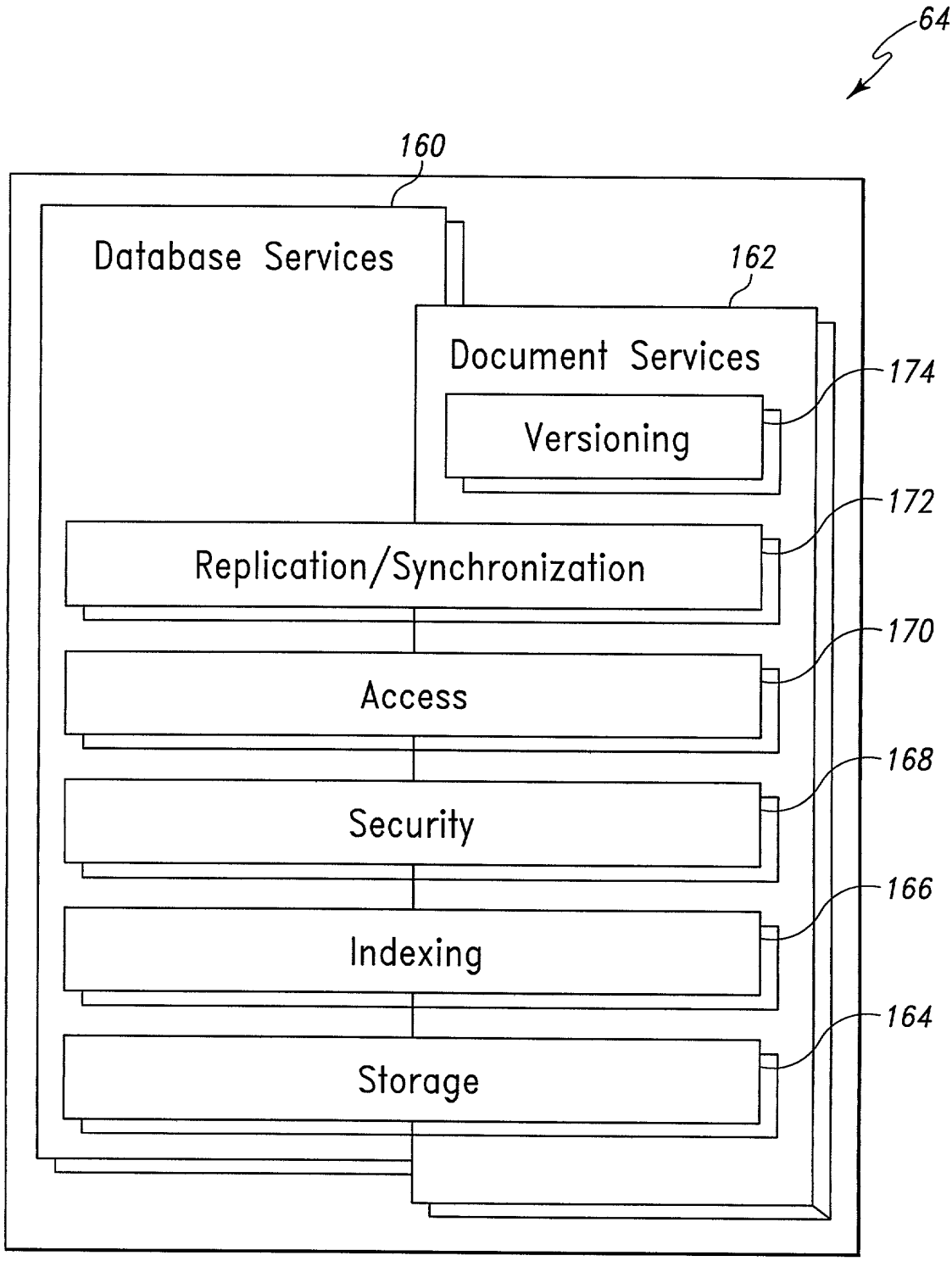


Fig. 6


64
160
Database Services
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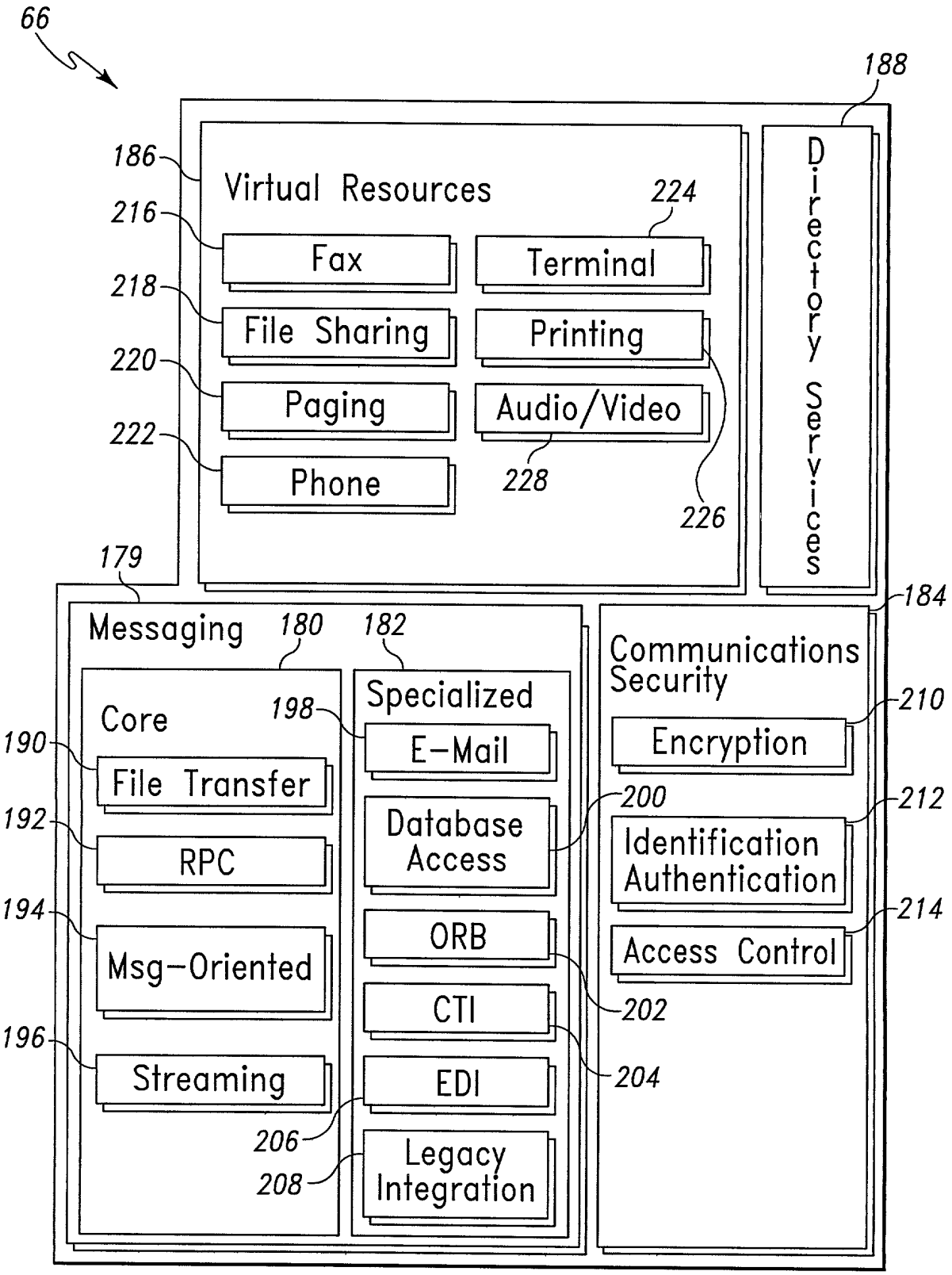
Document Services
174
Versioning
172
Replication/Synchronization
170
Access
168
Security
166
Indexing
164
Storage

Fig. 7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Virtual Resources
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Fax
Terminal
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File Sharing
Printing
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Paging
Audio/Video
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Phone
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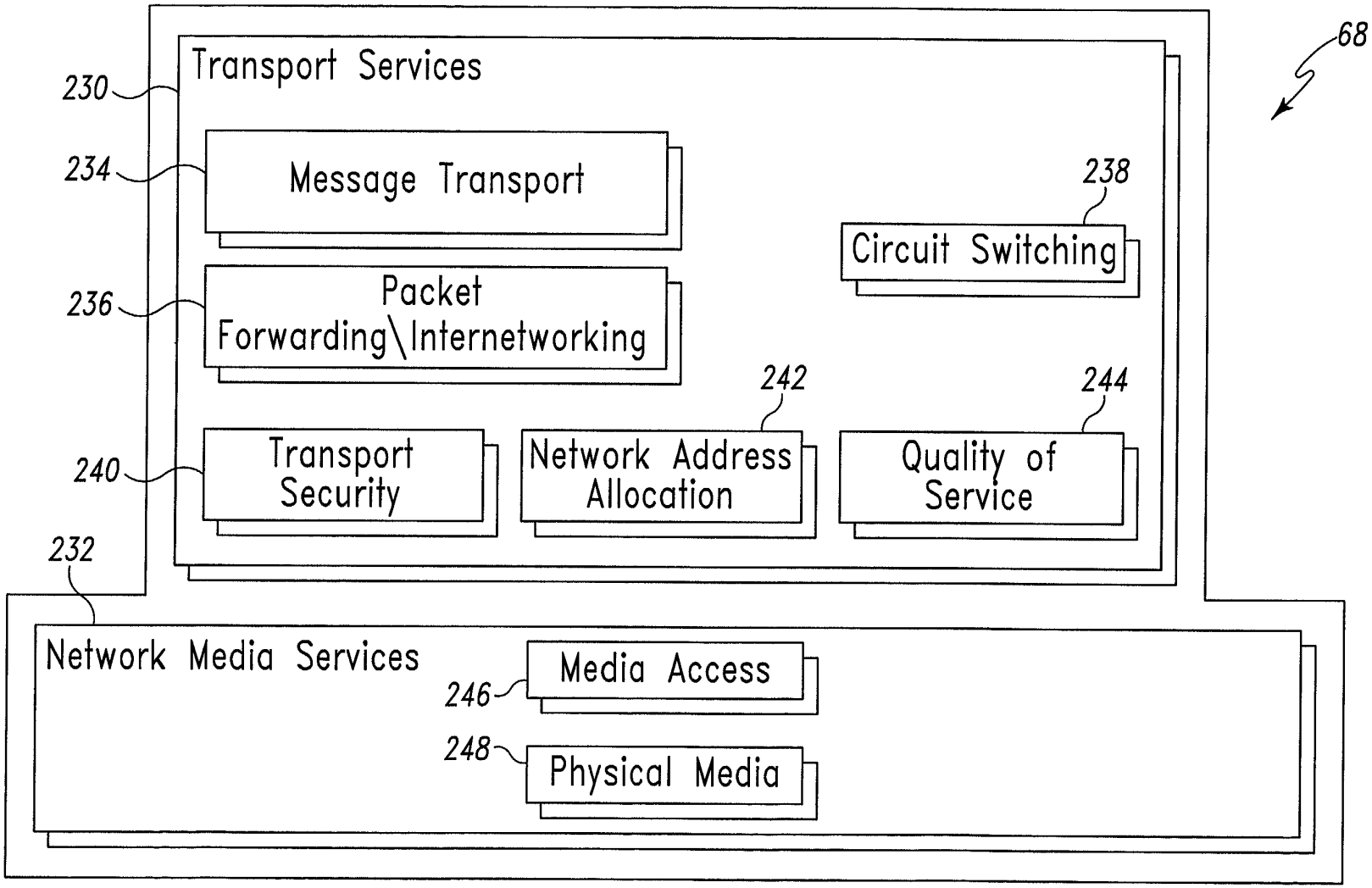
Directory Services
179
184
Messaging
180
182
Communications Security
Core
198
Specialized
210
190
File Transfer
E-Mail
Encryption
200
212
192
RPC
Database Access
Identification Authentication
194
Msg-Oriented
ORB
214
Access Control
202
CTI
196
Streaming
204
EDI
206
Legacy Integration
208

Fig. 8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Transport Services
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Message Transport
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Circuit Switching
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Packet
Forwarding\Internetworking
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Transport
Security
Network Address
Allocation
Quality of
Service
232
Network Media Services
246
Media Access
248
Physical Media

Fig. 9

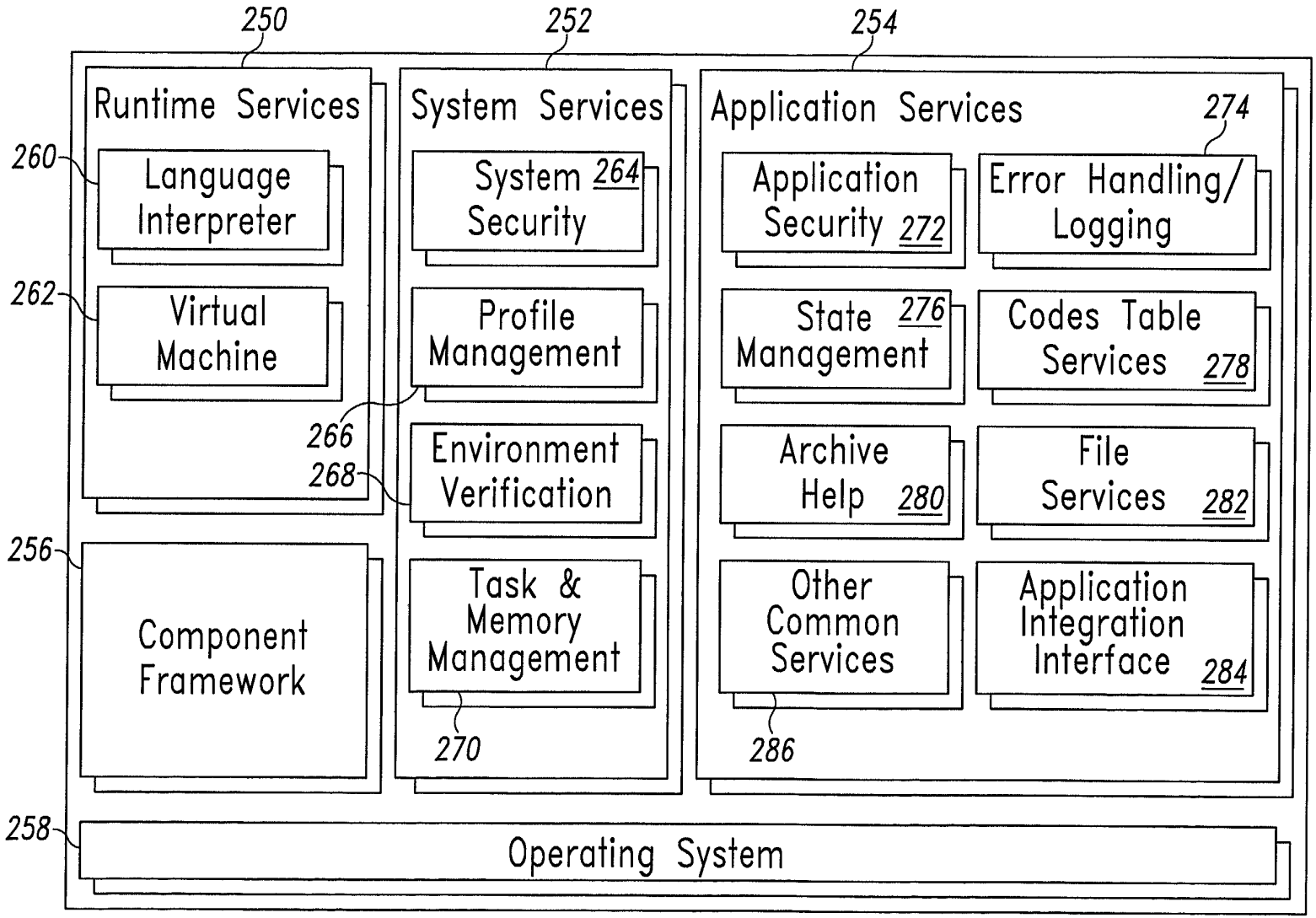
250
252
254
Runtime Services
System Services
Application Services
274
260
Language Interpreter
System 264 Security
Application Security 272
Error Handling/ Logging
262
Virtual Machine
Profile Management
State 276 Management
Codes Table Services 278
266
268
Environment Verification
Archive Help 280
File Services 282
256
Component Framework
Task & Memory Management
Other Common Services
Application Integration Interface 284
270
286
258
Operating System
72

Fig. 10

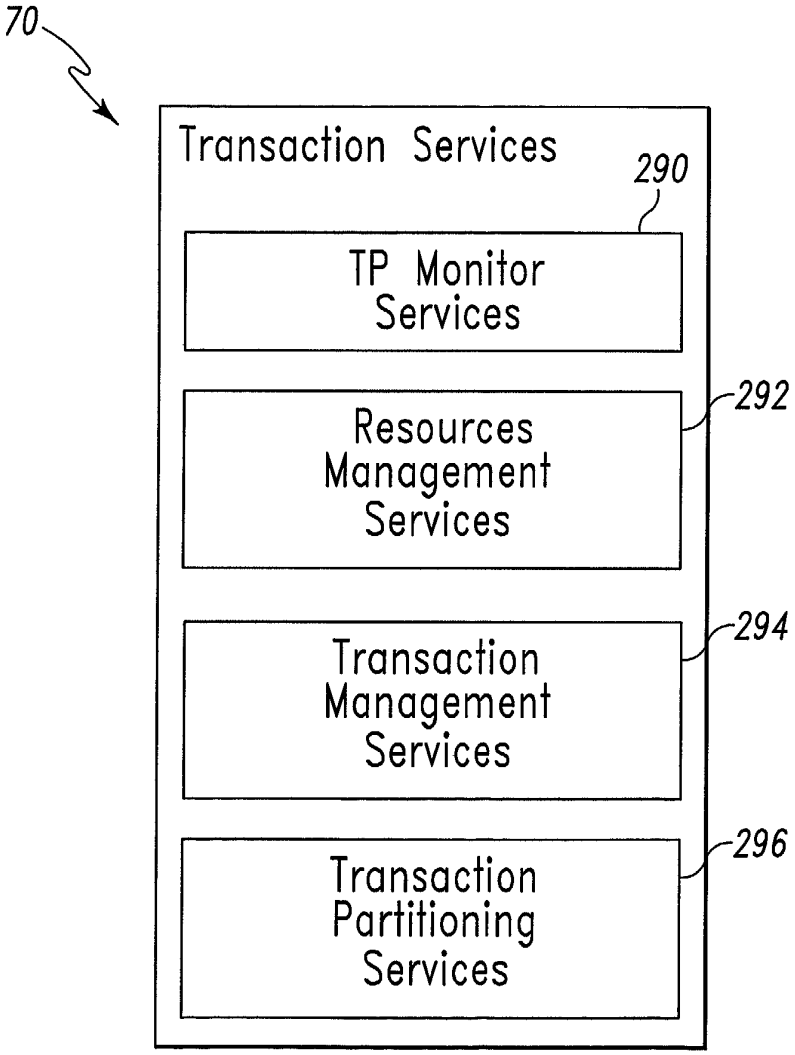
70
Transaction Services
290
TP Monitor Services
292
Resources Management Services
294
Transaction Management Services
296
Transaction Partitioning Services

Fig. 11

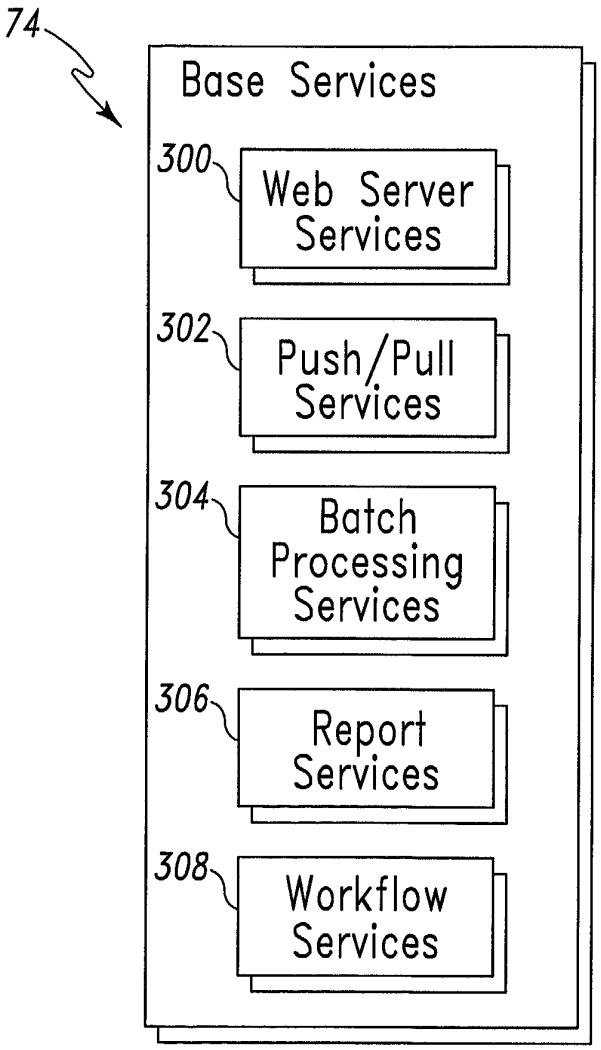
74
Base Services
300
Web Server Services
302
Push/Pull Services
304
Batch Processing Services
306
Report Services
308
Workflow Services

Fig. 12

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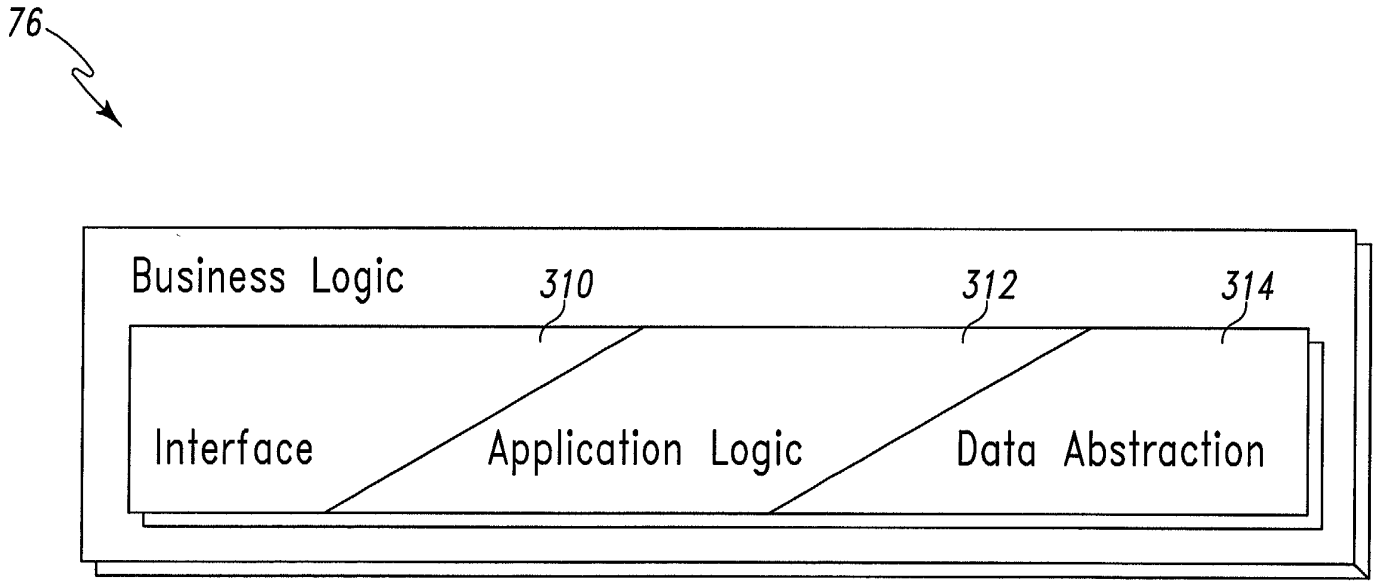
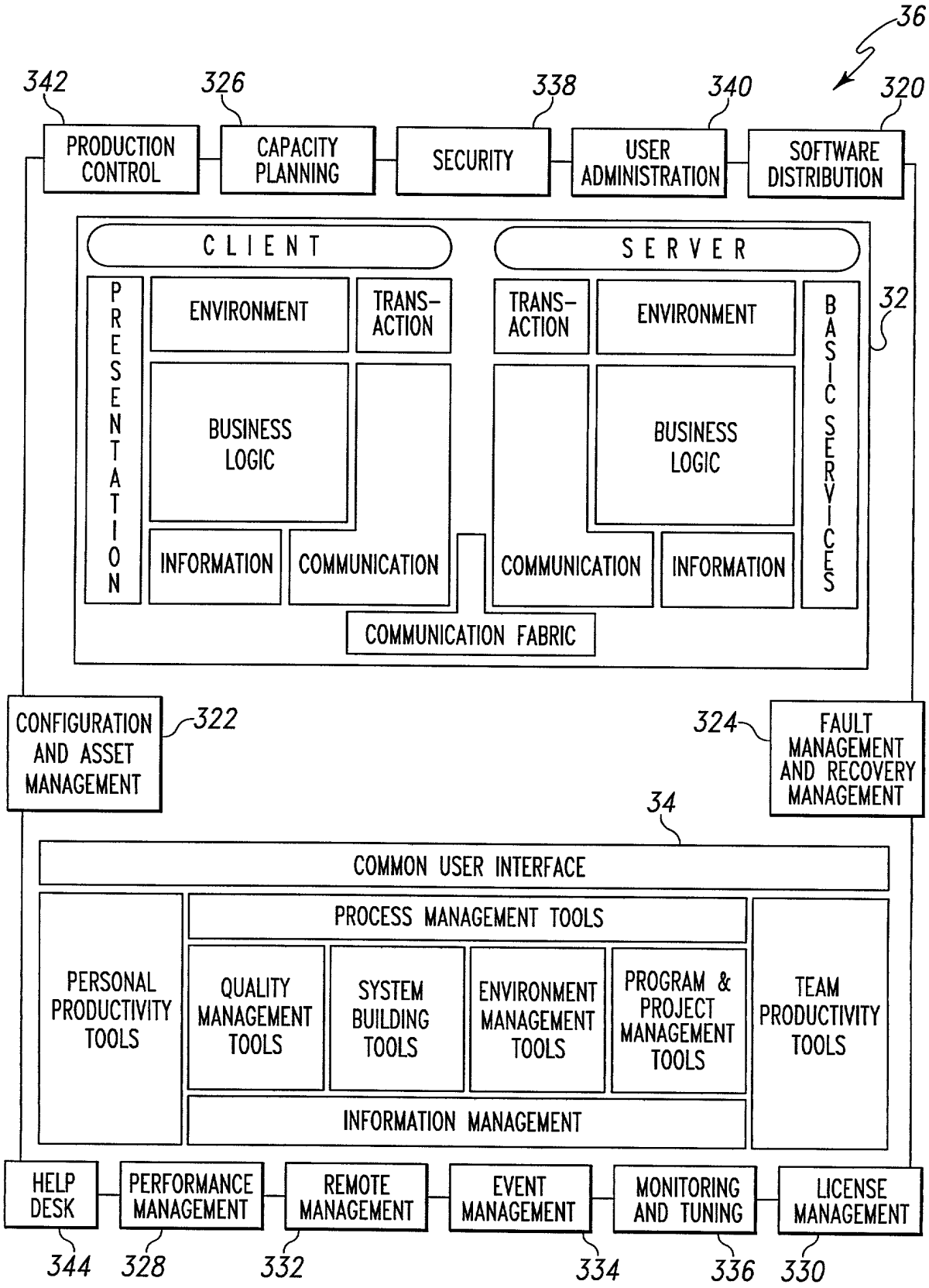


Fig. 13


36
342
326
338
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PRODUCTION CONTROL
CAPACITY PLANNING
SECURITY
USER ADMINISTRATION
SOFTWARE DISTRIBUTION
CLIENT
SERVER
PRESENTATION
ENVIRONMENT
TRANS-ACTION
BUSINESS LOGIC
INFORMATION
COMMUNICATION
TRANS-ACTION
ENVIRONMENT
BUSINESS LOGIC
COMMUNICATION
INFORMATION
BASIC SERVICES
32
COMMUNICATION FABRIC
CONFIGURATION AND ASSET MANAGEMENT
322
324
FAULT MANAGEMENT AND RECOVERY MANAGEMENT
34
COMMON USER INTERFACE
PERSONAL PRODUCTIVITY TOOLS
PROCESS MANAGEMENT TOOLS
QUALITY MANAGEMENT TOOLS
SYSTEM BUILDING TOOLS
ENVIRONMENT MANAGEMENT TOOLS
PROGRAM & PROJECT MANAGEMENT TOOLS
TEAM PRODUCTIVITY TOOLS
INFORMATION MANAGEMENT
HELP DESK
PERFORMANCE MANAGEMENT
REMOTE MANAGEMENT
EVENT MANAGEMENT
MONITORING AND TUNING
LICENSE MANAGEMENT
344
328
332
334
336
330

Fig. 14

Case No. 10022/035

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS, the specification of which:

☐ is attached hereto.

☒ was filed on September 29, 2000 as Application Serial No. unknown.

☐ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
N/A			☐	☒
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below:

60/156,962	October 1, 1999
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

N/A		None
(Application Serial No.)	(Filing Date)	(Status-patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Inventor's Signature _____ Date: _____

Full name of sole or first inventor: Scott R. Sargent

Residence: Kenilworth, IL

Citizenship: United States

Post Office Address: 415 Essex Road, Kenilworth, IL 60043

BRINKS HOFER GILSON & LIONE
One Indiana Square, Suite 2425
Indianapolis, IN 46204
(317) 636-0886

Case No. 10022/035

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled ARCHITECTURES FOR NETCENTRIC COMPUTING SYSTEMS, the specification of which:

☐ is attached hereto.

☒ was filed on September 29, 2000 as Application Serial No. unknown.

☐ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, § 1.56(a).

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N/A		None

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Inventor's Signature	_____ Date: _____
Full name of sole or first inventor	Stanton J. Taylor
Residence	Green Oaks, IL
Citizenship	United States
Post Office Address	31475 N. Reigate Lane, Green Oaks, IL 60048

BRINKS HOFER GILSON & LIONE
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N/A		None
(Application Serial No.)	(Filing Date)	(Status-patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Inventor's Signature	_____	Date: _____
Full name of sole or first inventor	Hugh W. Ryan	
Residence	Wadsworth, IL	
Citizenship	United States	
Post Office Address	17075 Yearling Lane, Wadsworth, IL 60083	

BRINKS HOFER GILSON & LIONE
One Indiana Square, Suite 2425
Indianapolis, IN 46204
(317) 636-0886